GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXLVIII. No. 2948.] LONDON, NOV. 11, 1919. [71ST YEAR. PRICE 8d.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C. 2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 LONDON WALL.

TORBAY METER ENAMEL.

The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

A British Gas Engineer writes:

"The presence of Sulphur and Ammonia Gases on these Works render it ABSOLUTELY NECESSARY for us to use

ALUMINIUM TRANSMISSION LINES."

Write for Gas Leaflet.
THE BRITISH ALUMINIUM CO., LTD.,
109, Queen Victoria Street, London.

GAS & CANNEL COAL CONTRACTORS.
WM. F. RUSSELL & SONS.
Telegrams for all Offices: "MONKLAND."
GLASGOW: 90, Mitchell Street;
NEWCASTLE: Exchange Buildings;
HULL: Exchange Buildings, Lowgate;
LIVERPOOL: 5, Castle St.; &
SWANSEA: Atlantic Buildings.

W. PARKINSON & CO.
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON & BIRMINGHAM.
(See Advertisement p. 304).

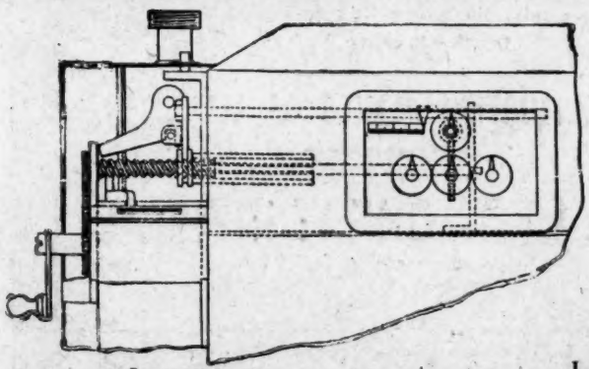
R. & W. HAWTHORN LESLIE & CO., LTD.
In Stock.
TANK LOCOMOTIVES
Always in Progress.
Locomotive & Marine Engineers & Shipbuilders,
NEWCASTLE-ON-TYNE.

INTERMITTENT VERTICALS.
Adopted all over the World.
Vertical Gas Retort Syndicate LTD.,
17, VICTORIA ST., WESTMINSTER, S.W.
Sole Agents for Australasia—
JAMES HURLL & CO. LTD., SYDNEY.

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

GEORGE GLOVER & CO., LTD.,
CHELSEA.



"THE STANDARD"
SLOT METER.
THE ACME OF SIMPLICITY.
NO SPRING in any part of the mechanism.
Can be fitted with **STRONG BOX,** if desired, or with **"M & M" LOCK.**

LONDON:
RANELAGH WORKS, ROYAL AVENUE, CHELSEA, S.W. 3.
TELEPHONE: 1140 Kensington.
WIRE: "Dry Meters, London."

LEEDS:
9, DEWSBURY ROAD.
TELEPHONE: No. 26463.
WIRE: "Meters, Leeds."

MANCHESTER:
GAYTHORN METER WORKS, EASTON STREET.
TELEPHONE: No. 6898 City.
WIRE: "Slot, Manchester."

RITCHIE C.I. PIPES FOR GAS & WATER. MIDDLESBROUGH.

J. & J. BRADDOCK

(Branch of Meters Limited),

GLOBE METER WORKS,

Telegrams: "Braddock, Oldham." Telephone 815.

OLDHAM,

AND

45 & 47, WESTMINSTER BRIDGE ROAD,

Telegrams: "Metrique, Lamb London." Telephone 2412 Hop.

LONDON, S.E. 1.

MANUFACTURERS OF HIGH-CLASS

GAS STATION METERS.

BRADDOCK'S

STATION GOVERNORS

AND

RETORT-HOUSE GOVERNORS.

IMPROVED

WET & DRY GAS METERS

OF BEST QUALITY.

BRADDOCK'S PATENT

"SLOT" METERS.

FULL PARTICULARS ON APPLICATION.

RETORT SETTINGS

WILSON'S (CONT-INT.) VERTICALS

HISLOP'S HORIZONTALS

RENEWALS &

NEW BENCHES

GAS-WORKS ERECTED COMPLETE.

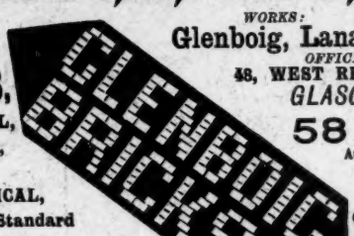
R. & G. HISLOP, Underwood House, PAISLEY

THE GLENBOIG UNION FIRE-CLAY Co. Ltd.

WORKS: Glenboig, Lanarkshire.

OFFICES: 48, WEST REGENT ST., GLASGOW.

GAS-RETORTS, HORIZONTAL, INCLINED, and VERTICAL, to New Standard Specification.



58 FIRST AWARDS At International and Home Exhibitions, including Grand Prize at Brussels, 1910.

In every case the highest award given for Fire Clay Goods.

The Glenboig Bricks, Blocks, and Retorts combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

B DONKIN D

FIG 536.

TAR, LIQUOR, & WATER PUMPS

MADE IN TEN SIZES.

Can be arranged for Working by Power or Hand.

BEST WORKMANSHIP, PROMPT DELIVERY.

Particulars sent on Application.

Makers of all types of Valves for Gas, Water, Liquor, and Chemicals, including Double-Faced Valves and Quick-Opening Valves.

GAS EXHAUSTING PLANTS OF ALL SIZES.

THE BRYAN DONKIN CO., LTD., CHESTERFIELD.

London Office: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.

Chesterfield Telegrams, "Donkin Chesterfield."
London Telegrams, "Donkin Vic. London."

B CHESTERFIELD D

GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLVIII., No. 2948.] TUESDAY, NOVEMBER 11, 1919. [71ST YEAR.

EDITORIAL NOTES.

The Revised Terms.

THERE has been time for the gas profession to calmly reflect over the revised recommendations as to the working conditions under which Sir George Beilby and his colleagues have advised that the gas industry should work in future. So far as we have had opportunities for gathering expressions of competent opinion, there is almost general satisfaction—exceptions are few—regarding the new terms, other than in respect of inerts, many gas men considering that the varied conditions of working in the industry as between one undertaking and another, and between different seasons, would have fairly warranted a larger margin than has been allowed. There need, we think, be no doubt now as to the Government having adopted the recommendations; for the President of the Board of Trade has stated in the House the intention to introduce as early as possible a measure to give effect to the recommendations. Moreover, the public are beginning to get interested, through the notice that the newspapers have been taking of the impending change, and to which publicity work the interview which Sir George Beilby had with Press representatives last Friday afternoon, for the purpose of affording explanation (as reported in other columns), has given good stimulus.

It was quite impossible to expect that the revised recommendations would please everybody. It would have been quite a unique thing, in this world of varied thought and belief, if the Board of Fuel Research had succeeded in giving universal satisfaction. The situation is a novel one; and progress is built up by novelty, which, in turn (with time), becomes commonplace. The purchase and sale of B.Th.U. will be a novelty in which the British gas industry is going to lead the way, and so be pioneers; and it will not be long before the public will forget that in the past they purchased by the cubic foot something of (to them) an unknown quality. They will be better pleased to have the assurance that they are getting the value for which they pay. But there are those within the gas industry who are discontented over the limit of 20 p.ct. put upon inerts, and the ultimate descent to 15 p.ct. There has also been suggestion that resistance should be offered to the limitation. This is where the value of sober reflection comes in. When it is remembered that the recommendations as they now stand are the result of keen argument from the side of the industry and by those who have mistakenly opposed its liberties in the name of the public, and so bear the impress and authority of the best agreement that give-and-take could come to, the question of resistance and fighting is one that must be handled very diplomatically. Suppose the gas industry rejected the limitation of the inerts, what would happen then? There would be a fight in Parliament the like of which the gas industry has never yet experienced; and the industry might issue from it still in the position in which it stands to-day. If this were so, it would mean a set-back to the industry from which it might take several years to recover—in fact, it might never be able to make up the ground lost. We have the advantage, if the industry takes what is offered, of being able to start-off almost immediately on a new career. There will be no waiting for plans for districting the country, for the construction of super-stations and transmission lines, and for making an immense re-organization. We shall know quickly where we are, and what has to be done; and every individual gas manager will be able to show the shrewdness of his perception by the way he sets to work. The recommendations are a gain to the industry. They mean, as Dr. E. W. Smith pointed out at the recent Midland meeting, a more flexible industry, and the opportunity to work to a much higher standard of technical efficiency. The industry must, therefore, do nothing to sacrifice what it has gained, which will enable it to render an enlarged public service. Better far will it be to work from the new stage; and, if there is further economy to be obtained by still greater liberty, it will be easier to show it under the new conditions than under the old. The new conditions will enable the industry to ascertain whether or not the highest attainable efficiency can be realized under them; if not, then the proof will be available.

Parliament much prefers gradual development to sudden revolution; and the majority of the technical men of the industry are wise in their recognition of this. We are not any more pleased with the narrow limitation of inerts than many other people are. It is unnecessarily close. Investigations have shown that efficiency is not injured by a much larger percentage; and Dr. Smith, at the Midland meeting already referred to, spoke to having no personal objection to 30 p.ct., providing it was constant. A lower percentage is, of course, preferable if maximum technical efficiency is not interfered with, and economy is not prejudiced. We know what can be done by modern gas-manufacturing processes; but all plants are not modern, and they are not likely to be for some time to come. There are, too, the gas consumers' appliances and the house piping. The gas industry does not want any reflux from too long strides being made at once. Of late, complaints of "bad gas" have been frequently heard. The consumers may be excused for their ignorance. It is not the gas that is wrong, but the pressure at the place of consumption. Where complaint is made, it is generally found that the house gas-piping (that was originally designed for providing lighting only) has not sufficient carrying capacity. A case in point came to our notice only recently. There are two neighbouring houses, built many years ago. In one, all the lighting, bedroom heating, and cooking are done by gas. The gas-pipes in the house have never been changed since the house was erected, nor have the pipes in the second house, in which only the bedroom and bath-water heating is done by gas. The occupants of the first house have lately complained that the gas is bad; the occupants in the second house have drawn their attention to the heating efficiency of their gas-fires. The whole explanation is that the pipes have never been enlarged, and under the new conditions those in the first house are now overloaded. But because of such (not universal) experience, economy cannot be stayed. It will be necessary, in cases, for the conditions of use to be improved.

So far as to the Beilby report. What there is a longing to know throughout the industry is as to what financial revision is going to be proposed. It is likely to be on a pre-war dividend basis; but there are men in good position in the industry who feel that the old capital ought to be placed in a position equivalent to the new, in view of the changed economic circumstances—in short, that while the affairs of the industry are undergoing remodelling, the work should be thorough, and that, in effect, a completely new start should be given to the industry in conformity with altered conditions. The matter has been discussed by us on a previous occasion [see second editorial article, Sept. 23]; and there certainly is much to be said for the view. The final determination, however, rests outside the industry. The industry can only appeal for justice, and hope right will prevail.

Compulsory Chemistry in Gas-Works.

THERE is one aspect of the approaching change in the conditions of operation in the gas industry that has been largely overlooked. It is that in the future all gas undertakings—not only the big ones, but down to the small ones—will, under the new order of things, have to have recourse to simple chemical control and analysis, as well as a knowledge of the use of calorimeters—ordinary and recording. The restriction as to inerts is the condition that will call for chemical work; and those gas managers who have not paid much heed to such matters will do well to bestir themselves in preparation for the eventful day when they will have to change over from the sale of cubic feet to the vending of B.Th.U., with restricted incombustibles in company. We see the South Metropolitan Gas Company are generously placing at the disposal of the gas industry the chemical processes that have been developed in their laboratories, which processes have been patented for the protection not only of the Company but of the British gas industry. To any British gas undertaking, the use of the processes will be granted without royalty, by application being made to the Company. This is an opportune announcement; and opportune, too, is the paper that Mr. W. Buckley and Dr. F. S. Sinnatt submitted to the members of the Manchester Institution of Gas Engineers a few days ago, and which was published in our columns last week. It described an improved form of apparatus for the complete analysis of town gas. The apparatus has the two great merits of being simple in construction and easy to manipulate. In fact, possession of the necessary glassware will enable any gas official with an elementary knowledge of chemical analytical work to provide himself with the apparatus, and carry out the tests. And we may accept the assurance of such men as Mr. Buckley and Dr. Sinnatt that, in the hands of a careful operator, the results are uniformly accurate. Of course, such work must not be performed in negligent manner. Temperature changes—one of the chief sources of error in chemical analysis—must be noted. There must be cleanliness; and the instructions for operating the apparatus must be scrupulously followed. It is only by accuracy in detail that accuracy in result can be ensured, and the result be of real assistance to the gas engineer. We are not speaking here, of course, to the old laboratory hands of the gas industry. There is another rank of worker going to join them, to whom all such chemical supervising work will be novel. We may strongly advise all responsible gas engineers and managers who have not an assistant with chemical knowledge to read carefully the Manchester Institution paper.

With the coming change, gas engineers and managers will have to be satisfied completely that they are keeping well to the calorific value which they declare as the one upon which they intend to do business, as well as be able to prove that they are within the limits as to inerts; for it is certain local authorities will make it more their business in the future than in the past to see that gas suppliers are keeping to the specified bounds. This, however, is not the only reason for proper chemical supervision. There is importance in governing scientifically the utilization of coal bought at such high prices as those of the present, so that the utmost may be realized from it. From the beginnings which will have to be made, if the Bill which the Board of Trade are now preparing passes safely through Parliament, there will be developments in chemical work which will be of immense advantage to every gas-works, though home chemical work must not affect centralized co-operative investigation in connection with the larger problems that abound in an industry like gas supply, with its chemical basis and ramifications. In this connection, it will be interesting to learn what the Committee of the Manchester Institution will recommend in answer to the suggestion in the paper as to a Central Laboratory for the district, where investigations could be carried out, and analyses made of samples of products submitted by gas undertakings in the area without the facilities for chemical work beyond the bare requisite for governing quality within the terms of the Board of Fuel Research report.

The analyses given in the paper of straight coal gas and mixed gases are highly interesting; and they illustrate how charge-steaming or properly-made blue water gas keeps the total inerts well under the limit that is going to be imposed on the industry. This limit, as we remarked last week, will be an incentive to larger recourse to steaming and water-gas systems, in conjunction with the economy which the Board of Fuel Research are patently so anxious to promote in the utilization of coal. As the quantity of gas made per ton of coal handled is only stated in two out of the ten cases comprised in the analyses, comparison cannot be made (using the calorific power calculated from the analysis), except in cases Nos. 6 and 7, of the thermal value put into the mains in the form of gas. No. 6 case is for vertical retorts—the make of gas being 13,000 c.ft. per ton. No. 7 is for the same retorts (three years later) with steaming; and the production is 20,000 c.ft. Using the calculated calorific power, the latter system puts into the mains about 1½ million B.Th.U. per ton of coal more than before steaming was practised. The whole paper was particularly appropriate to current events, which, we believe, are going to affect so considerably the fortunes and the work of the industry.

The Company on the Other Side.

THE boast has again been made in a public print as to the superior behaviour and unblemished character of the South Metropolitan Gas Company in the matter of gas quality. It is the popularity of gas not only in South London, but in an area of the country that happens to be much larger that causes gas to be so frequently the subject of attack for some assumed defection. Occasionally when there are these outbursts, representatives of the Daily Press seek information; and some of the information gained is of a character that cannot make public relations happier for the big part of the gas industry not under the management of the South Metropolitan Company. When the Public Press applies in the Old Kent Road, it learns of, among other things, the pre-eminent character of the service rendered to the public by that Company, and—inferentially at any rate—of the inferior service of other gas companies. The administrators of other gas companies do not, directly or indirectly, traduce the services of the South Metropolitan Company to its consumers; but they are not prepared to agree with that Company's estimate of the services they render to their consumers.

There is something in existence called the "Poor Gas Scandal." "Poor gas," be it marked—not poor pressures, or house-piping of insufficient capacity, or appliances that are not properly adjusted. In connection with this so-called "scandal," a representative of the "Daily Sketch" in some way or other got into communication with the Secretary of the South Metropolitan Gas Company; and he says that gentleman informed him that "all through the war and the "coal strike, we have maintained our pre-war standard." The poor daily newspaper man, who has to take such words at their surface value, knows nothing about the relative degree to which oil-washing of gas was carried out during the war by different companies in the service of the country, nor does he know that a gas undertaking that supplies such a pre-war standard of gas as the South Metropolitan Company must be using—say, per million B.Th.U. produced in the form of gas—a larger proportion of coal than other companies, and this at a time when coal was so scarce in London and the price so high, and the people without gas appliances were badly wanting coal. This applies now; it is likely to apply more acutely when the greater pressure for coal comes during the severest winter months.

Then it is alleged that the "Daily Sketch" representative was informed that when the Coal Controller during the strike [apparently the railway and not the coal strike is intended] ordered that the make of gas should be stretched, the price of gas ought also to have been lowered in fairness to the consumers. "He didn't do so," continues the statement, "and consumers were really paying the ordinary "price for a diluted article." The South Metropolitan Company made no announcement as to the lowering of their price on the Board of Trade Order being issued; so that we suppose the statement in the "Daily Sketch" may be interpreted as meaning that, while other gas undertakings were doing their best to comply with the instructions of the Board of Trade and the Coal Controller, the South Metropolitan Company were simply ignoring them. [On this matter, the Gas Light and Coke Company, it will be seen from a communication on p. 309, has addressed a letter to the Board of Trade.] As to the price of gas, we hope that in "fair play" the "Daily Sketch" man was told something more than appears in the sentences he published. While a Bill is in preparation dealing with the affairs of the industry, no good purpose can be served by attempting to

increase any sporadic soreness produced by the difficulties of the times. We can only feel surprised and sorry that the statement as to fairness and price was allowed publication. The Secretary of the South Metropolitan Company knows full well that, whatever pecuniary advantage there may be (if any, in these years of peculiar financial hardship in the industry) is not actually lost by the consumers, and that gas undertakings are not profiteers.. It certainly will not be any gain to the stockholders. Was this explained? If not, why not? Would it have spoilt the point, and the dig at the companies who have tried to obey the urgent request to make the coal carbonized go as far as possible? While there was some talk of "fairness" to the consumer, did the Secretary of the Company mete out "fairness" to those companies who oil-washed their gas during the war, and used less coal than the South Metropolitan Company in proportion to the output of gas translated into B.Th.U. It is hoped by many gas companies, besides the South Metropolitan Company, that the day is not far distant when gas consumers will be charged for the B.Th.U. supplied, and no more.

Whether the statements of the Secretary of the South Metropolitan Company were in any way qualified, we do not know. We hope they were. All that we can deal with is what was published; and we have not seen in the "Daily Sketch" any protest from the Secretary on the ground of misrepresentation. In the circumstances, it can only be assumed there was no misrepresentation. However, we have never been able to discover that any gratification is obtainable by gas men from unnecessarily applying, through the general newspapers, a little irritant to the public, and so helping to contribute to the difficulties of the industry. Perhaps we have not looked in the right direction to find such gratification; and certainly we have no desire to do so.

Electricity and Any Other Form of Energy.

THERE has not so far been any success on the part of the gas industry in seeking an amendment of sub-section 2 of clause 15 of the Electricity Supply Bill, which opens the door to new competition in energy with the statutorily empowered gas industry. The objectionable words in the sub-section are "or for the supply by the Board of any "form of energy other than electricity." There can be only one interpretation of this. It authorizes the District Electricity Boards to indulge in even the sale of energy in the form of gas, however produced, which is quite foreign to the work of electricity generation. The Home Secretary (Mr. Shortt) clung tenaciously to the words, and put about them all the protection that he could possibly give. He did not want to lose them, and he did not wish them to be qualified. In fine, in his opinion, they are badly wanted. It appeared, however, that the essential character with which he invested them was only to be found in the fact that the district electricity authority might want to dispose of some of the waste heat, or other forms of generating power. If this is really so, then why should it not have been made absolutely clear? The Home Secretary even hesitated to let the word "surplus" be inserted before "energy," though he subsequently expressed his preparedness to accept the suggestion for further consideration. But on a vote by only part of the members present, this proposal was also rejected.

As Mr. G. Balfour, who kindly moved the omission of the phrase, pointed out, the presence of the words will enable the district electricity authorities to lay down pipes, and enter into competition with those already supplying gaseous energy; and it is not right that these authorities should be allowed to spread their arms in this way, and take business outside their legitimate province. They would strongly object to Parliament allowing gas undertakings generating electricity for their own purposes, to dispose in competition with them of any surplus that they might obtain by working their generating plant to best advantage. Mr. Shortt tried to evade the real point, by declaring that the district electricity authorities would not be able to enter into these external business enterprises without the consent of the Electricity Commissioners. But there is the fact that he does not want to resign the proposed power to the Commissioners to authorize business in energy that is not electrical. It is just this power that the gas industry desires to have annulled in the protection of their statutory rights. It is more important to the gas industry and power gas companies to retain in its integrity the authority to be the suppliers of gaseous energy than it is to the district electricity authorities to supply forms of energy other than electricity. As already remarked, the attempt to secure the amendment was in this instance unsuccessful; but the National Gas Council, who moved in the matter, will endeavour at every possible stage of the Bill to have the necessary modification made.

Should this Country Trade with the Central Powers?

THE paper that Mr. Samuel Cutler, jun., read before the Society of British Gas Industries on the subject of trading with the Central Powers is published by us to-day, with an abridged report of the discussion. The paper was alive with thought, argument, and facts. But a matter of policy is involved; and a matter of policy of this particular kind is one that cannot be disposed of in any dogmatic or hasty manner. Mr. Cutler, however, does not conceal his personal views; and he does not deny the right of others to have theirs, though diametrically opposed to his own. The author's views are distinctly in favour of trading with the Central Powers; and up to a point he has the support of the President (Sir Arthur Duckham), who is a confessed and confirmed free trader. But the policies of free trade and protection must be examined in the light of to-day, and not in that obtaining prior to 1914. They must be investigated thoroughly in relation to the newly-created situation. Old political and economic principles and even sentiment must, if necessary, be abandoned, and expediency and other practical considerations govern decisions. Both the paper and the discussion are illustrative of the complexities of the question; and of how difficult it is for a number of men, though having more or less common interests, to make up their minds regarding them. To-day there are two main standpoints from which this question must be considered. One of them had no existence in 1914. Its existence is a very material one to-day in relation to our heavily pressing and unprecedented fiscal condition. The fact has to be faced, however much we may regret it, that if assistance is not rendered to Germany in connection with trading—if we do not buy from her and sell to her—we shall be doing something that will reduce her power to pay the Allies the money due under the terms of the Treaty. There is, of course, no obligation to assist Germany in any way to earn the money; but in view of what she owes to this country and others, is it or is it not prudent and expedient to help her to discharge the debt by, within certain limits, trading with her? There is only one answer to the question. It must be done; and we shall be betraying the interests of the country if we do not give the enabling power.

Then comes the question as to how far there should be trading. Mr. Balfour Browne, the President, and several others are favourable to raw materials being freely imported into this country, while protection as against Germany should be given in respect of manufactured goods. This is generally quite an acceptable position to take up; and it is not at all a bad one. But here again it depends on the character of the manufactured goods. Most of the goods made in Germany in pre-war days and exported to this country, it has been proved, can be produced just as well by our own factories. During the war we have been forced to do much which has brought into action a great deal of latent and undeveloped strength. And all manufacturing territory gained in this way is a national credit which must not be lightly sacrificed. Under certain conditions, our manufacturing industries should be protected for several reasons. To one of these special reasons, Mr. Balfour Browne gave utterance. He said, in effect, that by protecting British industries against the dumping of goods in this country by Germany, protection would be given to labour and employment, which are so highly essential to our national well-being. This is true. But there must be some assurance that our manufacturing industries have the capacity for meeting the demand, and for making and selling at reasonable prices. Otherwise, the protection of labour and employment will be largely discounted by the whole community having to pay more for the goods it requires. There must also be a care that protection is not used to enable trade unionists here to continue to press for higher wages, which must come out of the pockets of the British buyer, and which help to delimit our power of export. Some control over these matters might be obtained in the way suggested by Mr. F. C. Tilley, by Trade Committees being deputed

to make investigation, and determine the extent to which there should be, on the facts laid before them, safeguarding against German trade invasion. There is another reason for prudent protection. Industry and trade are the sources of our wealth; and the export of manufactured goods is a national and financial necessity. And while assistance should be afforded Germany, so far as is politic, to develop industry and trade so as to enable her to pay the money due under the Treaty, it would be sheer madness to do this to the present and permanent disadvantage of our industries, which also require all the succour that the Government can give them.

The whole question is a complex one, with many thorny difficulties encompassing it. No single paper, discussion, or article can possibly cover the whole of the considerations. It must be approached and handled with care and discrimination, with the one view of—despite political and economic theories—doing the right thing at this time in the interests of the country. But there is a broad base from which to begin discussion, with the view to determining policy, by accepting the principle of the admission of raw materials such as our industries require, and giving protection where desirable to our manufacturers. It is a composite policy which appears best to meet a grave situation. So Mr. Cutler's question is answered, within limits to be scrupulously defined, in the affirmative; and beyond those limits, in the negative. While saying this, there may be repetition of what has been said before in these columns—that the gas industry has never done very much trading with Germany, except in the matter of burners, fittings, and mantles; and even to this extent, it will not be ready to trade again so long as it is treated well by the British makers. In other respects the best plant, and the best makes of gas appliances were, before the war and are now, obtainable in this country; so there was no occasion to trade with Germany in these respects, and there is not likely to be with prices right. We do not therefore expect to hear for long to come, if ever, any more about gasholders or coke-oven plants or carbonizing chambers giving profitable employment to German money and labour. The best makes of burners, fittings, and mantles were also British produced. The temptation, however, to buy the cheapest goods was strong, and many were the victims of the temptation. But that this was to the interest of the industry may be confidently contested.

Plant Difficulties.

A valuable series of notes was presented to the Midland Junior Association on Thursday last by Mr. R. A. S. Browning, of the Nechells Gas-Works, Birmingham. The notes dealt with difficulties that had developed in plant, and had come under the author's observation. Such difficulties will occur in the best of managed plants through circumstances that are not always visible or easily found out, and investigation is necessary. The method of ascertaining what were the causes of the troubles and the remedies applied are described by Mr. Browning. Our object in referring to the paper here is to emphasize the point made by the author, as to the usefulness to gas engineers of a recital of difficulties, and of an explanation of the means adopted to deal with them. Thought and new suggestion are often stimulated by exchange of experience.

B.Th.U. Registration.

Credit must be given to Messrs. George Wilson and Co., of Coventry and Manchester, for being abreast of the times. They have invented—or one of their staff has done so—an additional piece of mechanism that, by arrangement with them, can be fitted to the meters of any maker, and which will register the number of B.Th.U. supplied to the consumers. Dials are made to suit the declared calorific value of the gas of any undertaking. The contrivance (which is described and illustrated in this issue) will enable consumers to readily check their accounts, and so save any bother which might arise through the registration being in cubic feet, and the charge based on the quantity (though well-authenticated) of B.Th.U. supplied per cubic foot.

The Recent Six Shilling Coal Increase.

According to the "Daily Telegraph," Sir Auckland Geddes, in an interview at Newport last Friday, intimated that he hoped to be able to remove shortly the 6s. per ton increase in the price of coal. He is anxious to take it off as soon as possible; but it all depends upon a higher output. As to output, the week ending Oct. 25 saw a production of 4,761,037 tons, which is the highest recorded since the reduction of the working hours in July. But, of course, more men are now employed, and transport facilities have improved. We hope the miners will continue to justify their claim that the reduction of working hours will not necessarily reduce production. The miners, it is noticed, are asking that the question of the 6s. per ton increase shall be investigated in conjunction with other matters that are to be discussed with the Government. If the 6s. can be abandoned, the gas industry will derive from it a considerable amount of satisfaction. But we must not build hopes too strongly on this yet—more especially as later papers intimate that any reduction that may be made will be by easy stages.

The Junction of Gas, Electricity, and Motor Fuel.

The Motor Legislation Committee have been urging that amendments should be made to the Electricity Supply Bill, with the object of increasing the production of motor spirit and other valuable bye-products. The means they suggest for doing this is that super-power stations should be prefaced by coal-carbonizing plants. The Motor Legislation Committee do not know what they are talking about, nor what it all means. Coal conservation, and the correct use of coal, are as important as the supply of motor fuel; and, in such matters, one of the failings of this country has been to jump at conclusions, rather than arrive at them by careful investigation. The right course would be to have the coal carbonized where the most profitable use can be made of the gas by the community. The larger the urban use of this labour-saving fuel is developed the better. The resulting product coke, mixed with coals not best suited for carbonizing, makes a good fuel for steam-raising with boilers properly fitted for the purpose. This is where the junction should be effected between the work of the gas and electricity industries, and at the same time serve the object that the Motor Legislation Committee have in view.

Is There to be More Railway Trouble?

Whatever the Executive of the National Union of Railwaymen may determine which might lead to the calling of another strike will, we should imagine, be closely investigated by the rank-and-file before they engage in once more arousing the public in opposition to them. There is less cause now than ever for any precipitate action with wages stabilized until Sept. 30 next. But at a special delegate conference of the Union held last week, it was decided that there must be an immediate settlement of the demand for a post-war standardized wage for the various grades of the railway service. This demand means the highest pre-war rate paid on any railway for a particular grade, *plus* the war wage of 33s. This is the very question on which the split between the Government and the Union took place that resulted in the strike. It is the principle adopted in the fixing of the post-war wages of the locomotive men; and the Union leaders contend that the same principle must now be followed in fixing the wage standard of all other grades of workers. This is not right. The standardization question was taken up by the Government on the lines that each grade of service must be considered on its merits, although before the strike the Government made an offer of 40s. minimum to the lowest grade of workers. The delegates, it is said, are determined to have an immediate settlement, and the one which they have dictated. As a preliminary to their proposed forceful methods, they have produced a sop for the rank-and-file by deciding that the strike pay shall be increased to 24s. per week.

Temporary Increase of Charges Act.—The Ministry of Health have made Orders authorizing the Goole Urban District Council to increase their maximum price for gas from 5s. to 6s. per 1000 c.ft., and the Swadlincote Urban Council from 4s. 6d. per 1000 c.ft. within the district and 5s. outside to 5s. 6d. within the district and 6s. outside. The Ministry have received applications for Orders from the Abertillery Urban District Council, the Cockermouth Urban District Council, and the Portmadoc Urban District Council.

PERSONAL.

Mr. JOHN IRMINGER, B.Sc.Tech., has been appointed Engineer and General Manager to the Corporation Gas-Works, Bergen, Norway, in succession to the late Mr. Schieldrop. Mr. Irminger took his degree of B.Sc.Tech. at the College of Technology, Manchester University, in 1906. The same year he became Assistant to Mr. B. F. Browne at the Retiro Gas-Works in Buenos Ayres. Two years later he was appointed Superintendent of the Retiro Gas-Works; and in 1911 he became Superintendent of the Belgrano Gas-Works. Since 1912 he has been with West's Gas Improvement Company, Ltd., of Manchester, superintending the building of vertical-retort plants at Stockholm, Goteborg, Montreal, and Ottawa. During the latter part of the war he has been engaged on experimental work relating to the production of fuel oils for the navy, the steaming of retorts, &c. He was born in 1882 at the Eastern Gas-Works, Copenhagen—being a son of the Chief Engineer, Mr. J. O. V. Irminger.

Mr. EDWARD GARSED, of Elland, the President of the Yorkshire Junior Gas Association, has been appointed Chief Accountant of Oriental Gas Company, Calcutta. Mr. Garsed has had nineteen years' service with the Elland-cum-Greetland Gas Company, with a break of five years during which he was Secretary and Manager of the gas undertaking at Kippax. He was Hon. Secretary of the Yorkshire Juniors for several years before becoming President. One of the most popular members of the industry in Yorkshire, many friends will wish him good fortune in his new sphere of work in India.

The members of the staff of the Manchester Corporation Gas Department last Friday presented Mr. J. O. GREENHALGH, who has just completed fifty years' service in the department, with a silver tea service. Mr. F. A. Price, the Superintendent of the Gas Department, presided at the ceremony; and the presentation was made by the Lord Mayor (Alderman Kay), who is Chairman of the Gas Committee.

Mr. JOSEPH CALVERT, J.P., who was last Friday presented with the freedom of Middlesbrough on relinquishing the Mayoralty after occupying the position for four years, has always taken a keen interest in the Corporation gas undertaking. It was entirely through his instigation that the Council entered into an agreement with a local iron-works for the purchase of crude coke-oven gas instead of manufacturing gas at the Corporation works.

Mr. ERNEST C. BOUGHTON, of the Bradford Gas Department, has been appointed Assistant Secretary to an important Employers' Federation in London, at a commencing salary of £350 per annum. For several years, Mr. Boughton has been Secretary to Mr. Charles Wood. During the war Mr. Boughton served as a Lieutenant in the Duke of Wellington's (West Riding) Regiment and the Machine Gun Corps, and was severely wounded at Le Cateau three weeks before the signing of the armistice.

GOVERNMENT INSTRUCTIONS AND CALORIFIC POWER IN LONDON.

AT the request of the Governor (Mr. D. Milne Watson), there has been forwarded to us by Mr. W. L. Galbraith, the Secretary of the Gas Light and Coke Company, the following copy of a letter which has been addressed to the Board of Trade on the subject of the comparison, in a recent London County Council report, of the average calorific values of the gas supplied by the three Metropolitan Gas Companies.

THE GAS LIGHT AND COKE COMPANY.
Horseferry Road, Westminster, S.W.,
Nov. 7, 1919

Sir,—I am requested by the Directors of the Company to draw your attention to an extract from the last report of the Public Control Committee of the London County Council (published in the Public Press), making reference to the calorific value of the gas supplied to consumers within the Metropolitan area. The report in question contains a reference to an Order of the Board of Trade, made at the instance of the Coal Controller at the time of the recent railway strike, that the make of gas per ton of coal should be stretched to the uttermost, and that the maximum calorific value should temporarily be no higher than 425 B.Th.U. gross.

In the latter part of the same report, it is stated that, for the period from Sept. 29 to Oct. 18 inclusive, "the gas supplied by the South Metropolitan Gas Company was throughout of a much superior quality to that of the other two Companies." Returns of calorific value follow, indicating the averages of the calorific value of gas supplied by the three Companies, as follows:

Gas Light and Coke Company	449·3	B.Th.U. gross
Commercial Gas Company	467·2	,, ,,
South Metropolitan Gas Company. . . .	558·7	,, ,,

An accurate interpretation of the above would be that, whereas two of the Companies concerned did what they could to conform to the Board of Trade Order and to effect the economy of coal aimed at, the third Company was content to stand aside and continue so to conduct its manufacture as to distribute gas of no less calorific value than that supplied to its consumers previous to the Order being made.

We venture to suggest, however, that few readers of the London County Council report would gather from it any other impression than one prejudicial to the two Companies whose gas was officially designated—inferentially—as being of a "much inferior quality to that of the other one Company."

We wish it to be clearly understood that we are not in any way discussing the question of whether this or that calorific value is the best to manufacture and distribute for the public use, but that we were only acting in accordance with the Order of the Government in temporarily supplying gas of lower quality than formerly, and that we have returned some time since to the supply of higher quality gas. We do, however, wish strongly to protest that gas undertakings which loyally second the efforts of the Government Departments immediately concerned in promoting coal economy during a period of National crisis, such as the recent railway strike, should not, as a consequence, be prejudiced before the public by imputations contained in reports such as that to which we have drawn your attention.

In view of the fact that prominence has already been given to the whole question in the Public Press, we are sending copies of this letter to the Coal Controller, the London County Council, and the Public Press.—I am, &c.,

(Signed) W. L. GALBRAITH, Secretary.

The Assistant Secretary, Board of Trade,
Public Utilities and Harbours Department,
7, Whitehall Gardens, S.W. 1.

"MISUNDERSTANDINGS."

READERS will probably remember that in the "JOURNAL" for Oct. 7 criticism was made [p. 15] of an editorial paragraph on "Volume or Value" which had appeared in the "South Metropolitan Gas Company's Co-Partnership Journal;" and full quotation was given to the paragraph in the same issue on p. 39. The following reference to the subject appears, under the heading "Misunderstandings," in the November issue of the "Co-Partnership Journal;" and it may be left to speak for itself:

The "Editorial Notes" in our last number have had "greatness thrust upon them" by some highly esteemed technical papers, whose extreme sensitiveness led them to put the worst possible construction on some of our remarks. We had no intention of suggesting that technical journals would sacrifice their independence for the sake of subscriptions; what we did suggest was the possibility that the unpopularity of a movement *might*, for a time, deprive its pioneer of the active assistance of the Press. We are genuinely sorry that a more offensive meaning has been put upon our words, especially by the "GAS JOURNAL." As to the other criticisms of our editorial, we leave them to the judgment of those who have read the whole of our editorial, of which the "GAS JOURNAL" reprinted one paragraph. [See statement above.—ED. *G.J.*] In justice to all parties concerned, and to avoid possible misunderstandings in the future, we think it desirable that we should state in the plainest possible terms that—1. Everything in the editorial columns of the "Co-Partnership Journal" is written by the editor. To this rule there has never been any exception. 2. Every article by Dr. Carpenter which has been published in the "Co-Partnership Journal" during the last eleven years has borne his signature or initials. 3. Dr. Carpenter has never suggested any of the contents of the editorial columns. 4. Although the editor endeavours to represent what he conceives to be the policy of the Company on certain questions, the "Co-Partnership Journal" does not profess to "embody the official view" of the Company in its editorials. Official statements are signed by the Chairman or a responsible chief officer.

Gas in Housing Schemes.

We have been hearing much about housing schemes of late and the part that gas should play in them. A contribution to the subject, and one well worth reading, is made by Messrs. Fletcher, Russell, and Co., Ltd., in a neatly prepared and illustrated pamphlet, under the title of "A1 Homes for A1 People." The firm recognize that there can be no hard-and-fast treatment in providing the necessary heat to dwellings. Different conditions, different classes of tenants, different ideas of the architects or owners, have all to be considered and complied with. But the firm's productions, stretching from coal grates and cooking-ranges to gas-fires and cookers, water-heating appliances, and so forth, they can, from their own works, meet any variety of plans that may be put before them, though they do not themselves suggest anything more than a coal-grate in the living-room, with gas-cooker in the scullery; or alternatively, if it is desired to have a coal range and boiler in the kitchen, they strongly recommend the provision of a gas-cooker in the scullery, which is the proper place for it. This gas-cooker provision, they rightly say, is a *sine quâ non*. But for all other heating purposes—room and water (when, if one is fitted, the coal range is not in use)—gas is the one and only thing, unless large quantities of water are constantly required, and then, of course, coke comes in. But here the firm are dealing with housing schemes. The pamphlet is extremely interesting; and it is one that, in the hands of architects, should direct their minds into the right channels of thought and design.

The death is announced of Mr. J. F. WEST, who was at one time Engineer and Manager of the Stamford Gas-Works. He leaves a widow, and a son who is Gas Engineer and Manager at Newark.

ELECTRICITY SUPPLY MEMORANDA.

FOR many years it was one of the remarkable features of electrical propaganda for attacks to be made on gas lighting on the ground that the products of combustion rendered the air of normal rooms so impure that considerable harm was done to the occupants and affected health and vitality. But a curious aspect of this attitude was that there was no scientific or other confirmation of the allegation; and what is more, there has been no improvement of health or vitality, or a lessening of the death-rate, traceable to the progress that electric lighting has made. On the contrary, people who work long hours by the electric light complain of eye strain; and many oculists acknowledge that the electric light has had the effect of depreciating the visual power of the optical organs, and has helped to boost-up their professional work. Assumption for electrical business purposes was the only base for the allegations as to the inferior hygienic value of gas lighting; and the disproving case of the gas interests met with no better retort from the electrical side than ridicule, which is not the mode of science in dealing with a serious question. The ridicule came chiefly from those whose stock-in-trade in these matters is mere clap-trap; and a strange thing is that this appeared to suffice for the satisfaction of most electricians. Heat, carbonic acid, and water vapour are not deleterious within the limits found in any ordinary room where gas lighting is used, inasmuch as if there was not a constant change of the air of any room, whether gas or electric lighted (and it has been shown that the change proceeds more vigorously with the one system than the other), it would not be very long before with human occupation the conditions would become intolerable.

Unscientific Assumption

A scientific man of the position of Dr. Samuel Rideal cannot afford to indulge in assertions the truth of which he cannot demonstrate, and support by chemical analysis. And this question of atmospheric hygiene is a subject that is purely one for chemical and physiological investigation. If Dr. Rideal puts forward a case which cannot be substantiated, he would quickly be pounced upon by other scientists, and his false conclusions would be exposed without mercy. The paper he read before the British Commercial Gas Association a fortnight since, stands a direct challenge to those who seek to deny what he states as his findings from research into the alleged hygienic superiority of the electric light over gas; but there can be no destructive criticism of any value that is not based upon an investigation equally as searching and comprehensive as that in which Dr. Rideal has been engaged. Under the conditions of investigation, the rooms showed no marked difference as between gas and electricity in regard to heat, nor the air in respect of composition. No doubt the cause of this is traceable to greater air movement in the gas-lighted room than in the electric-lighted one. With natural ventilation there was practically the same proportions of carbonic acid for the two illuminants, which goes to support the greater air movement in the one room than the other. Therefore, there can be no surprise that the search for the physiological effects of lighting by gas was in the main a fruitless one. There can be no complaint on the part of electricians of the want of thoroughness in the physiological tests, with fifteen men subjected on more than fifty occasions to some 6000 tests calculated to detect any such falling-off in condition as might be expected to take place under either mode of illumination. There was absolute failure to disclose any measurable difference between one mode of lighting and the other; and in no case did they show deviation from normal conditions. Any slight differences noted were much less than those that are constantly produced in healthy subjects by slight changes in their condition or environment. The tests with the men (after a more or less exacting day's work) confined in rooms lighted in one case by gas and in the other by electricity were drastic ones; but continuous medical observation failed to detect any adverse influence of any kind created by the two lights—except that the optical tests showed a slight falling-off in visual power under the electric light. Persons peculiarly constituted may find one light or the other objectionable; but such cases belong to the domain of pathology rather than to that of hygiene. Dr. Rideal has been engaged on many investigations; but this one—critical and far-reaching—contains irrefutable confirmation of the results of the preceding ones.

And Scientific Facts.

Those who are thoughtful in the electricity supply industry are getting quite concerned over the indiscriminate way in which the so-called "half-watt," or gas-filled lamp, is being applied. References to the subject in the electrical papers are now becoming more frequent; and there is a growing and very genuine feeling that what is being done will only recoil upon the electricity supply industry, unless systematic work is undertaken to suppress the use of these lamps in their naked state. Studying the present-day shop window, "Electrical Industries" is tempted to reflect that the gas-filled lamp is not an unmixed blessing. Offences against the canons of illuminating engineering were serious enough with the vacuum type of lamp in use; but when gas-filled lamps replace those of the vacuum type, the offence becomes so intolerable that one can hardly imagine the culprits to be unaware of their sins. Nevertheless, our contemporary admits that they are, in the majority of cases, oblivious of the fact that there is anything objectionable in lamps of high intrinsic brilliancy placed within a few feet of the eye, and nearly level with it. If this is so, then it is time the Electrical Development Association started an educational campaign to set matters right in this respect within the industry itself. If men working in connection with the industry will permit this kind of thing without warning the users, it shows they are heedless of the interests of the industry, of their customers, and of their own future in regard to lighting. Once let these lamps get a bad name for eye injury, and it will take a long time to get rid of a reputation which will do the industry no good. It is true the gas-filled lamps are as easily purchased as any other commodity; but it would be simple enough to convey with the purchase a printed caution as to the misuse of the lamps, and advice as to the manner in which they should be used. Our contemporary refers to the stupidity displayed in the naked appearance of the lamps in window dressing; and it also asks what are we to make of shopkeepers who work for hours under the unrelieved rays of a 100-watt lamp, hung over the counter, or of workmen who repair boots and follow other trades under similar conditions. The case is put strongly when it said that "it is impossible that the manner in which the gas-filled lamp is being misused should not have an unfavourable reaction in course of time; and apart from its effect on the organs of sight, it represents a gross waste of light."

Whose Fault Is It?

It had been thought, before the recess, that the most controversial points connected with the Electricity Supply Bill had been disposed of; but, judging from the discussions that have been proceeding since the resumption of work by Standing Committee B, there are many other matters of principle in the Bill which require wordy contests. The fact is the Bill is one which schemes to grab all possible advantage for the new electrical state which the Government seeks to set up, even at the expeuse of the rights and freedom of people closely interested. An example is found in the discussion on clause 9, the end part of which makes it obligatory on the part of private owners of electricity generating plant (when establishing new plant) to comply with any regulations made by the Electricity Commissioners as to the type of current, frequency, and pressure to be used. That this gives the Commissioners most arbitrary powers over private property and freedom of action is patent; and Mr. George Balfour asked that the provision should be expunged. The Home Secretary let the "cat out of the bag" when he made a frank confession to the effect that the Government wanted to limit manufacturers as much as possible from establishing private plants. And then he added something which shows that load factors and so on are utter strangers to him when applied to electricity generation. He stated that "it was absolutely essential for a cheap and efficient supply that a central station should supply as many customers as possible. The load factor was a great essential; and if people set up private generating stations not only did it mean that they would not take a supply, but it would reduce the load factor at the generating station." The Home Secretary then heard a few home truths as to the accuracy of his technical knowledge. Of course, one can interpret quite clearly what Mr. Shortt was driving at; but that is not the whole question. In many large factories heat and steam are required for more purposes than one; and in many, too, there is waste heat. The overall economy of a factory requires that provision and utilization shall be on lines that best meet the needs of the establishment, and not of any outside body interested in getting the custom for power only. The individual has every right (of which he must not be deprived) to work on the most economical lines possible, without having any of his operations which are not detrimental to health or life externally controlled for the benefit of others. This is a matter in which the gas industry is more interested now than ever, as it hopes in the future with new powers to do more business in industrial gas. The clause as referred to in this paragraph remains unaltered, as the majority view of the Committee was that the Electricity Commissioners would not do anything that would be prejudicial to manufacturers running their own generating plants. But there is Mr. Shortt's candid confession, which does not look promising for putting forward facilities for the extension of private plants.

Manufacturers' Generating Plants.

Clause 15, sub-section 2, of the Electricity Supply Bill has also been discussed. The gas industry was anxious that a few words in the sub-section which would permit district electricity authorities doing business in forms of energy other than electricity should be deleted, or that exemption should be allowed to gaseous energy. No modification, however, was permitted at this stage. But we learn that objection is to be renewed when the measure passes to the House for further consideration. The matter is discussed in our editorial columns to-day.

Other Energy.

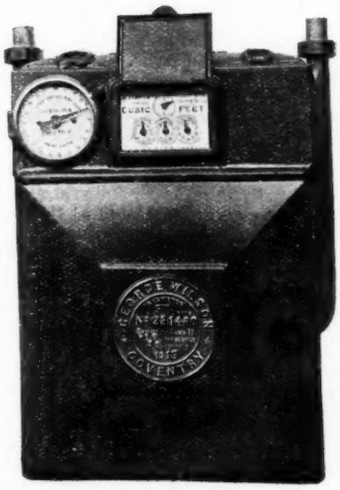
Electricity generating plant has been misbehaving itself rather prominently of late. Accrington, Bradford, Sunderland, and Greenwich have been assisting in keeping up the reputation of electricity supply for inconstancy. In the case of Accrington, the

Breakdowns.

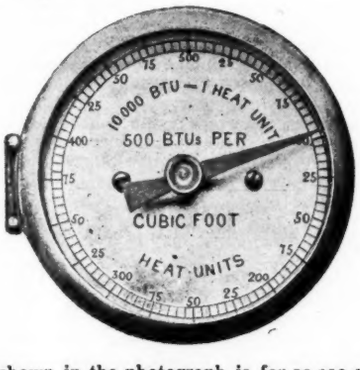
Electricity Committee ascribe the trouble to poor coal. We have had poor coal with us so long that, if this had been the only cause of failure, it is inexplicable why the plant did not make its protest earlier. Poor coal would only affect the steam-generating plant; and any shortage of steam, the generating capacity of the electric plant. It is, however, the breakdown of turbines and electric generators that have been the feature of recent failures; and the "Electrician" has called attention to the matter. It again emphasizes the importance of having sufficient reserve plant, points to the difficulties of the war years in respect of maintenance, and argues that manufacturers should give priority to the production of generating plant. Electric plant has many vital points, and is more liable than perhaps any other form of stationary mechanical plant to a withdrawal of service through suffering from defect in one form or another to which it is so susceptible.

A METER TO REGISTER BRITISH THERMAL UNITS.

ATTENTION is drawn by Messrs. George Wilson, of Coventry and Manchester, to an invention which has for its object to provide that the number of heat units contained in the gas that passes through a meter can be readily indicated, and to facilitate such indication even when gas of various calorific values is passed through the same meter. It is designed to meet the expressed desire by many gas engineers who, in the event of the proposed scheme of charging for gas on the heat unit basis being brought into operation, would require a meter to register B.Th.U. in such a simple manner as to permit of the consumer checking his consumption. By its use, gas supplied can be readily metered in thermal units according to the quality of the gas at any time, as well as in cubic feet.



The meter is arranged with an index geared to the usual recording mechanism, and can be easily adjusted for various qualities of gas by fixing different dials graduated according to the B.Th.U. contained in the gas. The dials are fixed by two screws from the outside of the meter, with an adjustable pointer fitted—thus allowing the meter to be adapted for any quality of gas without in any way interfering with the mechanism or necessitating the opening of the meter. The adjustable pointer also allows, if so desired, of its being set back to zero at each reading. The dial is covered by a hinged bezel and glass, and arrangements made for its being sealed.



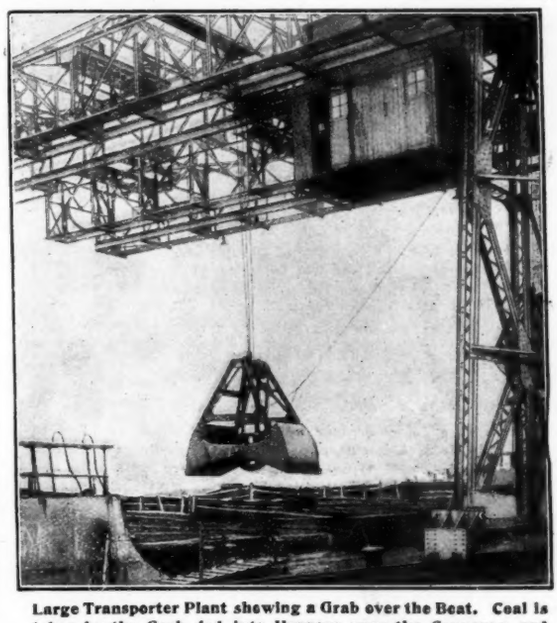
The dial shown in the photograph is for 10,000 c.ft., but may be also arranged for any desired quantity, as in the case of large meters, &c. It is shown graduated into one hundred heat units each containing 5 B.Th.U., and is for tthe registration of gas of 500 B.Th.U. quality. Should it be necessary to register gas of (say) 390 B.Th.U. per c.ft., a dial graduated into seventy-eight spaces each containing 5 B.Th.U. would be fixed; and so on, to meet the needs of the case.

The mechanism has been designed by Mr. J. Greenfield, who until recently was on the staff at Messrs. George Wilson's meter works at The Hague, but is now on their staff at the Coventry works. The index is adaptable to any manufacturer's type of meter, and can be fitted by arrangements with the makers.

AN INTERESTING VISIT TO FRASER AND CHALMERS' WORKS.

BY invitation of the General Electric Company, Ltd., a most interesting and instructive visit was paid, on Monday last week, by a party of gentlemen connected with engineering to Messrs. Fraser and Chalmers' Engineering Works at Erith, which works were taken over by the Company first mentioned in April, 1918.

The visitors were first conducted through the offices, which are well laid out and organized. The drawing offices appeal to those who have been through the work; their general fitting, and the abundant provision of light (which is so essential), being greatly admired. The pattern shop, which is adjacent to the drawing office (which again speaks of good organization), is equipped with all up-to-date labour-saving appliances. The pattern store is also worthy of note, as is also the very thorough way in which all patterns are recorded on a card-index file. From here the party were led to the smiths' shop, which is equipped with steam-hammers, sawing and cutting-off machinery, also an annealing furnace; and from there into the foundry, which, we believe, is the largest in the South of England. It is composed of two main bays, measuring 360 ft. by 155 ft.; its situation being approximately in the centre of the works, and adjacent to the main railway sidings. The entire length of these bays is covered by six



Large Transporter Plant showing a Grab over the Beat. Coal is taken by the Grab, fed into Hoppers over the Conveyor, and thence to the Storage Bunkers.

25-ton electrical overhead travelling cranes. The foundry is also well equipped with large and small jolt ramming machines, pneumatic moulding machines for repetition work, and Piftin hot-air mould-drying machines are installed. The casting work carried out in this foundry ranges from small castings up to mammoth ones of approximately 35 tons. The works are particularly well situated with regard to the supply of foundry sand, as the pits from which the sand is obtained for several of the foundries in the locality are in close proximity.

The boiler and plate shop is equipped with pneumatic tools for caulking and riveting, also hydraulic presses and riveting installations, oxy-acetylene and electrical cutting and welding plant, large shears, and rollers. The general engineering and machine shops are very extensive, and are equipped with overhead cranes up to 25 tons, large boring, turning, planing, and slotting machines. Close by this department is the tool room.

THE TURBINE DEPARTMENT.

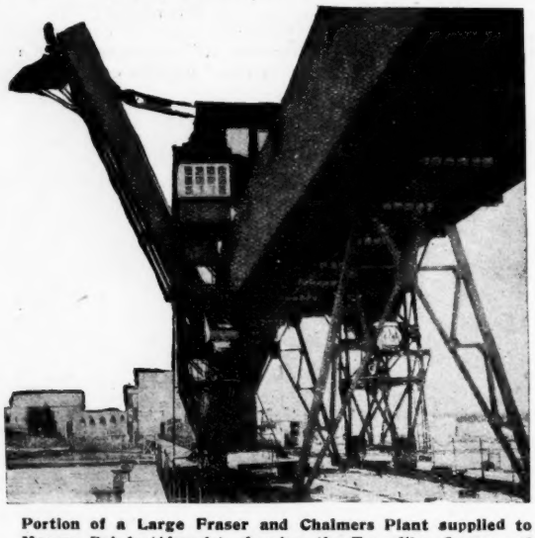
The party next visited the turbine department. This shop has been specially designed for the manufacture of large steam turbines, turbo-blowers, and turbo-compressors, and is excellently equipped. It contains boring and turning mills, planing machines, lathes, presses, &c. On either side of the shop is a gallery—one being fitted with milling machines for the manufacture of turbine

blades. Every possible care is exercised in the manufacture of these blades. The greatest possible attention has to be paid to the selection of the material, and the workmanship must be of the highest class. The other gallery is devoted entirely to assembling, riveting, and finishing wheels for turbines and blowers. Special electrical heating methods are applied, to ensure the satisfactory riveting of the bands at the ends of the blades.

COAL AND COKE HANDLING PLANTS.

The plants produced at the works which are of most interest to the gas industry are the grab transporters, belt, tray, and gravity bucket conveyors, bucket elevators and hoists, and turbine exhauster and compressor sets. Regarding the conveying plant, Messrs. Fraser and Chalmers have had very large experience in the construction of belt conveyors for coal, as well as scraper conveyors for hot coke. Some of the belt conveyors, fitted with Robbins belts, it was gathered have conveyed approximately 3 million tons per belt, which, experience tells us, is a very fine achievement. Many of the largest coal and ore shipping plants in the world have been made here, employing in their constitution belt conveyors and electrically-driven grab transporters.

Belt conveyors now in successful operation are dealing with quantities up to 1500 tons per hour on a single belt. But this, it is stated, is by no means the maximum size of belt possible. A piece of plant that strikes one as being very useful in these times is a simple form of portable loading and stacking conveyor, which is particularly useful for dealing with temporary stocks of coal dumped in odd places about yards. The structure of the machine is comparatively light; and it is rendered mobile and adaptable for all circumstances by being mounted on broad flanged wheels. It is also interesting to note that the firm have belt conveyors running which take limestone rock of 14 in. cube.



Portion of a Large Fraser and Chalmers Plant supplied to Messrs. Bairds (Almeria), showing the Travelling Course and one of the Outboard Arms. The Conveyors are 36 in. wide, and are capable of handling 800 Tons per Hour.

Without doubt, the conveyor department is excellently organized. It is understood that the firm undertake the design of complete equipment for mechanically handling any class of material; and it is perfectly obvious they have sound practical experience of the most important problems arising in this direction.

TURBINES, BLOWERS, AND COMPRESSORS.

With regard to turbines, Messrs. Fraser and Chalmers have developed the Rateau impulse type of turbine, and were the first British firm to take up the manufacture in this country. They were also foremost to develop the high, low, and mixed pressure turbines in high power machines, running up to 3000 R.P.M. Their production includes these types in standard sizes—ranging from 500 KW. to 30,000 KW. per unit.

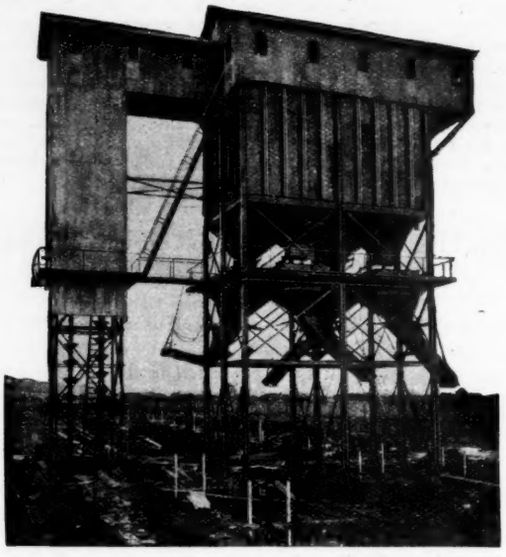
The visitors were fortunate enough to see a large unit under construction for the Corporation of Glasgow—a high-pressure machine, with a normal capacity of 15,000 KW., and an overload up to 23,500 KW., running at 1500 R.P.M., and designed for divided flow in the low-pressure stage.

In conjunction with their Witton works, the General Electric Company have unique facilities for supplying complete turbo-generating plant. They manufacture the Rateau turbo-blower in capacities ranging from 2000 to 60,000 c.ft. of free air per minute, at a pressure varying from 2 to 40 lbs. per square inch; also the Rateau turbo-compressor in standard sizes for delivering from 5000 to 50,000 c.ft. per minute at 50 to 130 lbs. per square inch.

Messrs. Fraser and Chalmers also specialize in marine turbines. The custom of the firm is to erect and test every machine in this department before dispatch; and this is a rule which must give confidence.

MISCELLANEOUS PRODUCTIONS.

The other productions of the firm are mining machinery, which includes stamp mills, tube mills, Hardinge mills, door machinery, crushing and screening plant, water-jacketed blast-furnaces, roasting furnaces, &c., steam and electric winding engines, also dry gas-cleaning plants of the Halberg-Beth process for dry-cleaning blast-furnace gases.



View of a Fraser and Chalmers Locomotive Coaling Station supplied to the Buenos Ayres Western Railway.

Great credit is due to the firm for the rapid way in which they emerged from a war to a peace basis. This result was successfully accomplished without in any way dislocating the labour market by discharges which, at that time, were of great importance in the national interest.

Gas Company Advertising.

The subject of advertising was very fully discussed by Mr. G. D. Mantle, in a paper which he submitted at the annual convention of the Pacific Coast Gas Association. If, he said, as he hoped to be able to prove, in the great majority of cases new business can be obtained for the expenditure only of the actual savings in the cost of gas due to the increased output, and leaving the margin of profit untouched, it would seem that no company could reasonably neglect to adopt a progressive sales and advertising policy. There is unfortunately a tendency to judge the efficiency of the new business departments entirely by their profit on the sale of appliances, and to overlook their real reason for existence. In view of the trend of modern business, it is remarkable that, while every device known to science which can be used to reduce costs or improve service has been adopted by the engineering departments of gas undertakings, little effort has been made to employ the equivalent advances made in the sciences of advertising and salesmanship. If those responsible for the new business departments would carefully survey their territories, and decide on the volume of new business they could reasonably expect to produce during the coming year, and could guarantee to obtain this new business at a cost which would be profitable to the company, they would be in a position at least as favourable as that of the engineering or other departments in asking for appropriations. He went on to suggest a plan for adoption by new business departments for securing appropriations, which plan involves: A guarantee to secure a definite increased gas consumption during the fiscal year; an additional guarantee to secure this new business at a cost not to exceed a specified maximum; and the presentation of a chart showing, in the great majority of cases, that the cost of securing the business will be more than offset by the saving in the cost of gas due to the increased output. Some time ago, he had occasion to make sales analyses of the properties of a large holding company—the investigation covering a number of large and small subsidiary companies operating under a great variety of conditions. In every instance it could be shown that the savings effected by a reasonable increase in output more than offset the cost of securing the new business.

Mr. John Phillips, late Secretary of the Bristol Gas Company, whose will has just been proved, left property valued for probate at £13,858 gross.

Fifty applications have been received for the post of Gas Engineer to the Blackburn Corporation; and these will be dealt with first by a Special Sub-Committee of the Gas Committee. The position carries with it a salary of £900 per annum.

Mr. F. Chambers, the Foundry General Manager of the Stanton Ironworks Company, Ltd., is retiring from the position, and his place is being taken by Mr. P. H. Wilson. Mr. Chambers is retaining his seat on the Stanton Board, and will continue to act as Consulting Engineer to the Company in connection with their foundry business.

THE HOUSING PROBLEM.

[Summaries of Two Papers Read at the Conference of the British Commercial Gas Association, on Oct. 29.]

FROM THE ARCHITECT'S STANDPOINT.

By EDWIN J. SADGROVE, President of the Society of Architects.

The author, who had consented at short notice to take the place, as reader of a paper, of Mr. Austen Hall, the Consulting Architect of the Association, dealt with "Practical Housing Schemes from the Architect's Standpoint." He said there were four fundamental points to consider in which the conference was specially interested, and upon which the gas industry could afford much useful information and assistance to those responsible for the preparation of housing schemes. There was the question of the cooking of the meals for the family, keeping the house clean, keeping it warm during cold weather, and lighting it during the hours of darkness. Further, it was of great importance that these functions should be performed with a minimum of labour, with the production of as little dirt as possible, both within the home and outside, and with a minimum of cost, having regard to the household budget as a whole.

Was it not time that it was generally recognized that the coal-range was an antiquated and inefficient piece of apparatus suited more to a museum than to a modern home? According to Prof. Barker (and there was no reason to doubt his figure) the average efficiency of coal-ranges in this country was 3 p.ct.—that was to say, out of every 100 tons of coal used in kitchen-ranges, the householders only obtained the useful heating work that could be done by 3 tons if all the potential heat in this quantity of coal were made available and utilized.

They knew from the figures which Sir Dugald Clerk and others had given, that, if coal was carbonized at the gas-works, and the resultant products of gas and coke were distributed to the community instead of raw coal, somewhere about 70 p.ct. of the heat of the coal was made available, in addition to the valuable chemical bye-products being preserved. And while it was true that, of the heat delivered to the gas-cooker, a considerable percentage was lost by radiation and in the products of combustion, a far higher percentage of the total heat in the coal destroyed was utilized in the gas cooker than in the coal-range. So, from the national economy point of view, the coal-range stood condemned. Was it not time that the architect, in planning the house of the future, should leave out the coal-range from his plans, and substitute apparatus that would do its work without defiling the atmosphere, or soiling the hands of those using it, which could be relied upon to be ready for service at any hour of day and night without making any work for anybody?

As an architect, he would recommend heating the kitchen by an ordinary open fireplace (because, of course, they had to consider the warming of the kitchen as a separate problem, if they abolished the coal-range), and the placing of a boiler at the back of the fireplace, so that when the fire was alight water would automatically be heated and conveyed to the hot-water cistern. Then he would recommend the installation of a gas-heated boiler, connected to the same circulating system as the boiler behind the fireplace; so that when no fire was required, hot water would be obtainable by the lighting of the gas-boiler. Even if the kitchen fire were alight, the hot-water supply could be augmented and accelerated by the lighting of the gas-boiler in addition to the fire, if that were found desirable. There was an alternative, and an efficient one, to the gas-boiler—a coke-heated boiler. But this, of course, while probably securing some economy in fuel consumption, added to the labour of the household in regard to the stoking of the fire and the removal of clinkers and ashes.

In these days of shortage of domestic labour, and at a time when all were seeking as far as possible to free work in the home from all dirty and laborious tasks, he could but feel that the utilization of gas as a fuel, both for cooking and hot water supply, except in so far as the latter could be provided from the kitchen fireplace, must commend itself as nearest the ideal. He had said nothing about electricity for cooking and water heating, as he was satisfied, both from theoretical considerations and from the practical experience of those who had tried both systems, that electricity could not be recommended for use as a fuel, either upon national grounds or upon the grounds of efficiency and cost, which particularly affected the individual consumer. What was needed was a method of heating that could be rapidly brought into action, and as rapidly put out of action, and that would give the appearance, as well as the feeling, of comfort which was so desirabie in a land where the skies are often gloomy and the air is often damp. He did not think that central heating arrangements were to be recommended in this country, except in the case of large public buildings.

The homes they had to consider would consist in almost every case of a living-room, a parlour (or occasional room), and bedrooms, in addition to the kitchen and bathroom. For the bedrooms and the parlour, obviously, the most convenient, and certainly the most economical, system of heating was not by coal-fires, which had to be burnt for hours even if heating was only required for a very short time, but by gas-fires which could be instantly lighted and as quickly put out, which made no dirt or work, and which complied with the requirements of hygiene. For the living-room a solid-fuel fire—coal, a mixture of coal and coke, wood or peat—would in the majority of cases be preferred by the occupants, both because for constant burning such a fire was cheaper than a gas-fire, and because the Englishman and Englishwoman loved to have a companionable, changing, flickering fire to sit and smoke or work by during the winter evenings.

The ordinary solid fuel grate and chimney adequate for carrying off the products of a coal grate should be provided in the living-room. But having regard to the urgent need for economy for which the country was crying out, and in view of the economy that could be effected by the abolition of the chimney-breasts and smoke-stacks required to carry off the products from coal-fires, and the substitution for them of smaller flues adequate to the carrying off of the products of combustion of gas-fires, it did appear to him that architects in designing housing schemes at the present time should take advantage of the fact that gas-fires are all that will be needed in all the rooms, other than living-rooms; and that the Ministry of Health and the building authorities generally should give ready consent to such proposals when put before them.

He was not afraid of committing himself to a policy, when he was sure that the policy was a sound and practical one; and while ten years ago he would certainly have hesitated to advocate such a revolutionary—or evolutionary—step in house construction, the enormous strides that had been made in gas-fire efficiency and the rapid disappearance of the old-time prejudice against gas-fires; and the widespread and growing popularity of that method of heating which had been witnessed in the last few years, had combined to convince him that a policy which was right from the communal point of view, and was sound from the individual point of view, would be generally acceptable to inhabitants of this country, if put into practical operation by enlightened housing authorities. He was therefore prepared to plump with his colleagues, who had given the matter careful consideration, for the abolition of the chimney-stack in respect of every room in the house with the exception of the living-room.

If Sir Charles Ruthen was right in estimating that before the needs of this country were fully satisfied, a million homes would have to be provided as quickly as they could be built, somewhere about £25,000,000 could be saved in labour and bricks by the adoption of the policy he had just advocated.

For many classes of property, he would without hesitation advocate electric light; but they had to remember that the great majority of the homes to be provided under the housing schemes would be occupied by those to whom economy was a prime consideration. In the household where economy was most closely studied, that means of lighting was most popular which assisted in the warming of the rooms, as well as providing them with ample light, whereby to carry out mending and other work entailing close application. It had been found that if gas light was not available, resort would in many cases be had to oil-lamps for lighting in preference to electricity, because the oil-lamp gave warmth in proportion to its light to a much greater degree than did an electric lamp. Moreover, in such homes there was often a good deal of rough usage; and it was much cheaper to replace an incandescent gas-mantle than a half-watt lamp. He believed, therefore, that householders generally would vote by a large majority for gas rather than electricity. But, apart from this consideration, must it not be borne in mind that great economy could be effected in the equipment of the houses to be built if the same mains, services, and internal pipes that were required to give the fuel supply to the home were utilized to give the supply of artificial light, instead of a further heavy expense being incurred for the laying of cables and wiring for the supply of electricity? It was very doubtful, again, whether in these homes the consumption of electricity for lighting would make it commercially profitable, or anything but very unprofitable, for a supply undertaking to lay main and service cables for such a limited demand; and therefore the cost of such supplies would in all probability have to be added to the initial building costs. He considered the case for the use of gas for lighting, as well as fuel, in the homes of those to whom cost was a prime consideration, was very strong.

FROM THE STANDPOINT OF THE SUPPLIER AND CONSUMER OF GAS.

By H. H. CREASEY, Consulting Expert to the Association.

The author, in a *résumé* of the paper prepared by himself, remarked: The standard of living of the working classes has been improving for some years, and will, it is hoped, improve still further in the immediate future. I believe that as time goes on they will not hesitate to spend a little extra in their homes for the provision of greater comfort and freedom from drudgery. Many foremen and first-class workmen earn as much as comparatively prosperous professional men and women. There is no reason why we should be afraid to encourage them to enjoy the inexpensive luxury of gas water-heaters, &c.

In the majority of cases, the tenants of the houses will be of the thrifty class, which do not like quarterly accounts. "Coin-in-the-slot" supplies will, therefore, predominate. Incandescent gas-burners should be installed throughout, with fittings of plain but solid design.

No house is complete without gas cooking apparatus. Women's committees and other experts are practically unanimous that gas-cookers should be installed. Letters were collected from working women by members of the Women's Housing Sub-Committee,

appointed by the Ministry of Reconstruction, and among the necessities mentioned was "a gas-cooker in every house."

The official aim is the improvement of the hygienic conditions of the working classes, and the saving of labour. At the moment, there is no other fuel than gas that can rapidly provide hot water at a fairly reasonable cost without labour, dust, and other disadvantages. But I am afraid it would be unwise to advocate its *exclusive* use for the majority of housing schemes.

I think the best solution of the problem is a combination of gas and solid fuel for water heating and cooking. A solid-fuel stove might be installed in the living-room, with a boiler at the back, and a gas-heated combination boiler and storage cylinder should be installed in the scullery. The pipes from the coal-fire boiler would be led into the cylinder portion of the apparatus, so that coal would be the source of heat when the weather is cold, and gas could be used in warmer weather for both cooking and water heating. The use of gas for water heating would then be more economical than in winter, because the starting temperature of the water is higher.

A combined gas water-heater and storage cylinder is fitted in the houses built on the Government scheme at Roe Green, Hendon. A new type of this apparatus, specially constructed to provide rapidly and cheaply the small quantity of water which is almost continuously needed for scullery purposes, and adjustable to supply sufficient water for a bath, if required, was specially mentioned by the Women's Advisory Committee, and has been approved by H.M. Office of Works for installation in the reconstruction scheme for converting a large number of houses into flats in London.

Solid fuel is recommended for the living-room, as the fire would probably be in continuous use in the cold weather; but gas-fires should be used where intermittent heating is necessary—*i.e.*, for bedrooms and parlours—as, apart from all other advantages, gas-fires prove really economical in fuel cost for such purposes. An efficient fire is provided in a few minutes, and fuel and cash expenditure instantly cease when the heat is no longer required, with no cleaning-up work to be done afterwards.

A large saving in the cost of building could be effected if, instead of coal-grates being purchased for these rooms, gas-grates of the type known as "built-in" fires were installed, and instead of building chimney-breasts and large chimney-stacks, flues of a suitable size were built in the wall to ventilate the rooms and remove combustion products. Gas-fires need much smaller flues than coal-fires, as they always remain the same size, while a coal-fire flue starts fouling and becoming reduced in size immediately the first fire is lighted. Articles setting out the economy which can be achieved by this method of building have appeared in the Technical Press; and definite proof of the correctness of the theory has recently been forthcoming.

A block of offices being erected in London, that were originally designed with coal-fires, flues, and chimney-breasts, have been redesigned by the architect, who proposes to instal gas-fires with ventilating shafts built in the walls. The following economies have resulted:

Saving in building cost, £180.
Increased floor space, 96 sq. ft.
Increased cubical capacity, about 5000 c.ft.

If the same system were adopted for Government housing schemes, £30 could be saved for each cottage, and about 30 sq. ft. of extra floor space obtained, with materially increased breathing space. Mr. Swain, the Architect to the Rowntree Garden Suburb, says about 5000 bricks and £42 per cottage can be saved. If applied to 500,000 houses, at £30 a house, this system would mean a saving of £15,000,000 and 2500 million bricks to the nation.

The hygiene of gas-fires is no longer questioned or questionable. Confirmation lies in the fact that they are installed in large numbers in hospitals, nursing homes, and tuberculosis dispensaries, and in the houses of medical officers of health, &c. The tenants would probably welcome the installation of gas-fires for the infrequent and intermittent heating required for parlours and bedrooms, so long as they have a coal-fire for their living room.

As regards refuse destruction, the refuse-bin—probably kept outside the window of, or adjacent to, the food cupboard—is an abomination; and the sooner it is entirely dispensed with, the better it will be for the health of the nation. Refuse should be burned instead of being left as a breeding ground for flies and a hot-bed of germ culture. Inexpensive gas-heated domestic refuse destructors can now be obtained. One type of these can be easily inserted within the fire-box of a coal-range during the summer, when gas would be used for cooking, and can be quickly removed when the coal-fire is again needed. Such appliances are very economical in consumption.

The only correct thing to do is to run gas supply-pipes in the houses in so thorough and complete a manner as to ensure that a pipe of adequate dimensions is ready in any and every position at which gas apparatus, either now or in the future, may be needed, so long as the buildings last.

Promoters of housing schemes cannot be content with the fittings and apparatus that were in many cases considered satisfactory in the past. Inverted incandescent gas-burners must replace flat-flames. A somewhat better type of cooker might be provided, as well as gas-fires and coppers and gas water-heating apparatus.

Standardized schemes are impossible, as conditions will vary in different parts of the kingdom. But whatever schemes are adopted by the various parties concerned, one thing at least is certain—that future gas installations must be as complete and up-to-date as possible, because the public demand it, and the public must be served.

Mr. Creasey's concluding paragraphs are reproduced in full.

Who is to pay for all these modern necessities? The usual procedure as regards pre-war "slot" supplies was that the gas undertaking bore the cost of the installation, supplying and fitting meter, cooker, and all lighting fittings—not necessarily incandescent burners. A small payment towards the first cost, or some rental, was paid by the consumer for anything outside the ordinary standard slot supply of the district. The gas undertaking recouped itself for its capital outlay, and for the fact that it received no rent for the meter and cooker, and that the cost of collection was increased, by making an additional charge per 1000 c.ft. consumed. To take a figure recognized by Parliament, we will say the extra cost to the consumer for the privileges obtained was (and is) 10d. per 1000 c.ft.

The capital expenditure incurred on the installation of merely an ordinary "standard" slot supply would at the present time be more than twice as great as it was before the war. Therefore, the question with which all gas undertakings are now faced is: How can a slot supply be regarded as a commercial proposition if the extra charge per 1000 c.ft. above the ordinary current price of gas, is not to be increased? It is therefore quite certain the authorities must assist the gas undertakings in meeting the cost of the far more comprehensive slot supplies which are really necessary if the desired object is to be attained—viz.: "An improved standard of living among the working classes."

Where economies are effected in the cost of building by the suggested method of installing gas-fires instead of coal-grates, this fact would probably be borne in mind by the authorities when discussing financial matters with a gas undertaking. In all cases mutually satisfactory terms will, no doubt, be agreed upon.

The financial situation might, perhaps, be met in one or other of the following ways:

1.—The authorities might provide all the apparatus at their expense, and the gas undertaking carry out the fixing work free of charge.
2.—The authorities might pay to the gas undertaking an appreciable amount in respect of each installation, the apparatus being supplied and installed by the gas undertaking, and remaining their property.

DISCUSSION.

The CHAIRMAN (Alderman F. S. Phillips, of Salford) said they had had two very good papers, containing much matter for thought.

Mr. F. W. GOODENOUGH, in moving a hearty vote of thanks to Mr. Sadgrove and Mr. Creasey, said he would like especially to thank the former gentleman for having so kindly stepped into the breach and put before them, at practically a few hours' notice, so interesting a paper. He wished to refer for a moment to correspondence they had had with Sir James Carmichael, Director General of Housing at the Ministry of Health, who would have presided that morning, but for other engagements. When the standard specification was recently issued by his Department, it was found to contain two things that seemed a disadvantage from the point of view of up-to-date gas installations. One was that it provided for the usual chimney-breasts and flues of ordinary magnitude for coal fires. Then the hot-water tank was to be of a minimum of 30 gallons capacity. As it was implied that very few alterations would be considered, and the specification had to form part of every housing scheme put forward, he wrote to Sir James asking him if he would authorize the informing of local authorities that alterations which would enable the smaller flues to be provided for gas-fires, instead of coal-grates, and the provision of smaller storage capacity if gas were used for water heating, would not lead to any scheme being turned-down by the Ministry of Health, as not complying with the standard that had been laid down. Sir James replied that there seemed to be no objection to local authorities being so informed; and they were therefore now in a position to tell housing authorities that such variations would be received favourably by the Ministry of Health. It was important that they should be able to inform these housing authorities that they could put forward thoroughly up-to-date schemes for the installation of gas, and that they would be received sympathetically at Whitehall.

Mr. R. M. ROWE (Ilfracombe), speaking as the Chairman of the Urban District Council of his town, said that while he was listening to the papers, it had occurred to him that those who were interested in the gas industry were convinced of the merits of the various points which had been so ably advocated; and so it seemed to him that for the moment the question that should press itself upon the conference was how best could the salient features of the matters be brought before the local authorities of the kingdom. He did not think there was very much time to be lost in this connection, because the housing schemes were fairly well advanced throughout the country; and they were being hurried-up to a considerable degree by the Ministry of Health. But there was still time to take some rather more active steps than had hitherto been taken in order to convince local authorities of the advantages of gas in the matters of heating, lighting, &c. Without intending disrespect to any councillor of any authority, he might say he had come to the conclusion that, in the main, the average councillor was more or less lethargic in relation to any heavy piece of literature sent him. Therefore he ventured very respectfully to submit for the consideration of the Executive Committee of this powerful organization the expediency of sending out very promptly, in some tabloid form, a summary of the excellent and incontrovertible points regarding the use of gas in the housing schemes. If in a short practical form the claims of the gas industry could be brought before individual councillors, it would be substantially of advantage to the industry, and an aid to the successful completion of the housing schemes before the country.

Sir GEORGE DAVIES (Bristol) remarked that he, too, wished to say a few

words as to the great importance, when housing schemes were being considered, of putting their views before the authorities as promptly and as powerfully as possible, in order that they might have effect. If the industry did not impress their views upon the local authorities now, before the building was done, it would be very much more difficult to induce them to make alterations afterwards, which would render more efficient the use of gas or any other agent. The thing that struck him that morning was the intensely practical recognition by the authors of the natural feeling on the part of the housewives in favour of a coal-fire for the ordinary living-room. He ventured to think, however true it might be scientifically that they should only have gas-fires in their houses, it would be exceedingly difficult to convince the ordinary housewife at the present time that this was the most comfortable form in which heat could be introduced into the living-room. But outside the one living-room, they had for purposes of cooking, heating bedrooms, &c., the most efficient, scientific, and hygienic form in which heat could be applied to them. Their thanks were due to the British Commercial Gas Association for the way in which they had secured correction of that most misleading recommendation on the part of the National Kitchens Committee in regard to the use of electricity. Apart from any interest they might have in gas, they all, as practical men knew, and housewives had come to recognize, that of all the wasteful forms in which one could use electricity, to endeavour to use it for cooking was the most wasteful; and it was little less than a scandal to him that the influence of the electric light industry was able to get a recommendation in the original instance that electricity should be used for cooking. It had been to the credit of the Association that they were able to promptly put before the authorities the undoubted fact that gas was far more efficient, far cheaper, and far more suitable for adoption in these housing schemes. They should express their obligation to the officers of the Association, who were able to secure the important modification to which reference had been made in connection with the housing schemes.

Mr. J. H. ELLIS (Plymouth) said the Association had already done a very great deal in the direction of distributing pamphlets; and he commended to them the suggestion that had been made by a previous speaker. In his own case, he had no coal in the house—only gas. He had hot water in every room, and found it a most economical thing to do. True, he secured the very best advice. He went to the Bournemouth Gas Company, than which there were few that were better managed in the country, and their very excellent servants told him exactly what to do. If they would all in their own houses be living examples of what could be done with gas, they would have an educational force which even pamphlets could not reach. A friend of his, shortly after he took up the position he now held in Plymouth, came to him, and said he could not keep his servant unless the Gas Company would put him in a cooker. He said to his friend: "She is a wise woman. I expect a consignment of cookers to-morrow; and if they arrive, you will keep your servant." This was what they had got to do—to study the interests of their consumers, and make themselves living object-lessons to them of what economy meant. He did not like to put too much on the able and willing shoulders of their Gas Engineer (Mr. Hoyte), who had to be under the well-nigh insufferable burden of absurd legislation, and that terrible "Old Man of the Sea," the Coal Controller; but that gentleman and the Company's architect had designed an all-gas house. They had got it passed by the Local Authority, and were going to build it. He believed it would be cheaper than that of any local authority. He was told by many friends that there were difficulties attendant upon it. But difficulties were things that it delighted one to overcome; and the gas industry had triumphed in making the best out of their residuals. Some of them had terrible trouble with their clinker; and if out of this they could make concrete blocks (which their friends the architects could deal with admirably), and get a profit out of them, and have their model houses on these lines, made with their own material—excepting the cement—then they would have demonstrated something further in the way of economy, and given a lead to the local authorities. The local authorities would not get on with these schemes so very quickly. The money had to be obtained first; and really they would not do any good with these schemes, or with anything else, until they followed the advice of Lord Moulton, and worked hard. Then they would get things cheap.

Bailie J. C. DRUMMOND (Glasgow) said he quite agreed that the members did get a big lot of pamphlets; but they had not time to get through them. He would urgently appeal to the Association to prepare a short, pithy epitome of what had been said at this meeting, to send to the various authorities at once. It was very urgent. If it was a million houses that were needed over the country, then the city he represented wanted about one-twentieth of the number. From 50,000 to 57,000 houses were stated to be required by Glasgow; and he had been reckoning how much saving would be represented by the suggestions made in connection with gas-fires, smaller flues, &c. It amounted to about £1,250,000 for the city of Glasgow.

Mr. SAMUEL TAGG (Preston) said he thought about one-half of the members of the Association represented local authorities. Therefore they were not speaking to those who needed conversion. The members representing local authorities could assist very greatly by giving a lead to the country in the matter of the full adoption of gas, because, whatever the relations of a gas company with a municipality might be, any proposals or recommendations they made were always more or less suspect. He thought the gas undertakings of local authorities could help the Association in a very tangible way,

Mr. H. M. THORNTON (London) said that probably the matter had been fully considered by the Executive and those issuing the "Bulletin;" but he did think, having such an excellent case in every direction, they ought to be strong enough to give the running cost of each of the articles necessary in a housing scheme. He knew he was treading on ground which had very often led to discussion; but these running costs were known. They were available; and it would strengthen the case for the gas industry if they were able to—and they could—give these running costs, which would show that the case was overwhelmingly in their favour. It would be very helpful indeed to everybody if they could have some running costs of the apparatus.

Mr. R. J. ROGERS (Birmingham), referring to Mr. Tagg's remarks as to what could be done by local authorities owning gas undertakings, said that in Birmingham they would have to build approximately the same number of houses as in Glasgow—50,000. There the Gas Department had already got in touch with the Town Planning Department; and so far as he was able to say now, the coal-fire in the living-room would be the only coal-fire put in these houses. He had been fighting for this. There was very little time in which to consider the matter; and he quite agreed with previous speakers that they must all of them promptly get to work in their respective departments. He felt they could be aided and assisted very considerably if the Executive of the Association were able to get some strong message from the Ministry responsible for the construction of these new houses—such as that only one coal-fire should be allowed in them, and all the rest should be gas. This might probably seem an extreme cry; but they had to rouse the public generally to this matter, and it was only by taking an extreme point that they would get the attention which the subject deserved. In Birmingham, the Gas Committee had consented to lay the whole of the service-pipes up to the houses, provided the pipes in the building were fixed to the specification of the Gas Department. They were an industry without any powers concerning the size of pipes, meters, and apparatus that should go into these houses; and he thought it would be a very great advantage for all gas undertakings to be able to say, "We will give you something if you will put in the houses the pipes and apparatus that we know are necessary."

The CHAIRMAN said he was sorry it was now necessary to close the discussion, which he thought might have been continued with very great benefit to all.

The vote of thanks to the authors for their papers was then heartily accorded.

THE SMOKE NUISANCE AND HYGIENE.

ADDRESSES AT THE "B.C.G.A." CONFERENCE.

On the afternoon of the first day [Oct. 28] of the recent conference of the British Commercial Gas Association, those present had the pleasure of listening to four extempore addresses on the subject of gas in relation to health. In the absence of Lord Moulton, the chair was taken by Sir PERCY STOTHERT, K.B.E.

THE SMOKE NUISANCE AND NATIONAL HEALTH.

The first address was by Dr. C. W. SALEEBY, who urged that the injurious effects of coal dust were not yet properly recognized. He suggested that there was great need for such a conference as this. He had just returned from Huddersfield, and had had time to wash off most of the dirt that had descended upon him; but he would carry to his grave a proportion of the coal smoke which he had inhaled since that morning. The body was not constructed to inhale coal smoke; and the consequence was that we had made ourselves a grey-lunged race, and we could never clean them. We were getting rid of the water-borne diseases; but we were not getting rid of the lung troubles. These were the perennial curse of our country—especially in the cold and the dark; and one of the things which cut out the daylight was the smoke. The effects of smoke on infant mortality were described in a striking manner; and reference was also made to the consequences on the eyes of having to use so much artificial light through the darkness caused by smoke.

The most interesting part of the subject to them, he said, was in relation to the kind of house it was said they were going to build. It would be rather a pity if they were going to ask posterity to live for generations in houses which would be obsolete in a decade or less. The present method of using coal was uneconomical and barbaric. If the country could not afford from the Association's point of view alone to go on doing this, and if the medical people were right who said the country could not afford to cut out the daylight, were we going to build the houses for such uses of coal? In New York, they did not use a kitchen range; the landlord supplied a gas-stove for cooking, as he did doors and floors. Were we going to build scores of thousands of houses in this country, and fit them with that antiquated abomination the kitchen range, which was condemned from every point of view? What would posterity say to us if we did? And were we going to make arrangements for guiding smoke into the air, when the first idea should be to design the houses so that there should be no smoke to guide into the air?

Dr. Saleeby went on to declare that he had never, on principle, bought an ounce of coal. When, as a student, he saw these lungs, he determined that he would not do so. He had nearly ruined himself with "electric sausages;" but he knew better now. On every account, we must make an end of the "hellish cloud of smoke," as John Evelyn called it, or it would very soon make an end of us. It destroyed the lives of the very old, and notably destroyed the lives of the very young, of whom in any case we were not producing enough. It was quite time to make an end of it.

The CHAIRMAN said he quite agreed that the smoke nuisance should if possible be done away with; and the Association could help very materially in this direction. Propaganda should be very actively carried on, to educate the people to the fact that the methods we had been used to in the past should be done away with at the earliest possible opportunity, and we should live under hygienic conditions in the future.

THE SMOKE NUISANCE: A PLEA FOR ACTION.

Dr. HAROLD A. DES VŒUX (the Hon. Treasurer of the Coal Smoke Abatement Society) followed with some further remarks

on the smoke nuisance, in the course of which he referred to the fact that Dr. J. S. Owens (the Secretary of the Atmospheric Pollution Committee) has recently invented an extraordinarily ingenious little instrument which records automatically the smoke in the atmosphere over a period of 24 hours. He hoped its use would become general, so that the state of the atmosphere in different parts of England would be duly recorded. For twenty years the Coal Smoke Abatement Society had preached that the outpouring of smoke was an iniquity; and for twenty years they had preached to deaf ears. People did not appreciate that we had been wasting coal for so many years; and it had taken a war to wake them up to this waste. He calculated the amount of coal thrown out into the atmosphere of London every day as 1000 tons; and this was an under-statement, rather than an over-estimate. What would people give now for the 1000 tons of coal which was poured into the atmosphere every day? Coal was very short, and it might be much shorter still this winter; yet of what coal people did get, they were wilfully going on throwing a large proportion into the air, to come down (every particle destructive and harmful) on themselves and on their houses.

The waste of coal in England had been appalling, and it had been absolutely because coal had been so cheap that people had had no incentive to save it. We could save it enormously if we wished, and each one could begin in his own house. In fact, he rather hoped the high price of coal might last a little longer; for a few years of expensive coal would probably do a good deal more to cure waste than many years of argument.

There was a little body called the Advisory Committee on Atmospheric Pollution; and Government had at last been wise enough to assist this organization, who had been collecting the material that fell from the atmosphere to the ground in a number of towns. Would it be believed that, in a town like Rochdale, the amount of deposit which fell was 89 tons per square mile per month? In the Embankment Gardens of London the quantity was about 62 tons a month; and in Newcastle-on-Tyne, 53 tons. Coming to the health resorts, there was only one which had ventured to put the matter to the test. This was Malvern, where it was only just over 6½ tons per month per square mile.

Many times he had tried to get the London County Council to take up the smoke question; but they would have nothing at all to do with it. They were going to spend about £1,000,000 on houses, and to put in the old bituminous coal-burning grates, which would probably be completely out of date within the next ten or twelve years. The London County Council were going on in the old way, as though there had been no crusade against the smoke. "Do you," asked Dr. Des Vœux, "believe that smoke is a natural constituent of the atmosphere? If so, do you like it; and if not, will you take some steps to get rid of it?"

The CHAIRMAN said no doubt the bulk of those present were engaged in the gas industry; and he hoped they were not burning coal in their grates. He himself had insisted on having every fire in his house a gas-fire—with one exception, and this was in his wife's sitting-room. In that case, the only stipulation he made was that she should not use coal, but wood. If they considered the absolutely self-sacrificing work which Dr. Des Vœux had done in this connection, they, on their part, could not fail to back him up in some small degree, by trying to do their best to bring about the reform he so ably advocated. The enormous amounts of filth in the different towns quoted—60 to 80 tons per square mile per month—must entail an enormous amount of labour in removal; for if it were allowed to accumulate, the levels of these towns would in a very short time reach the chimneys of the buildings.

SCIENTIFIC HEATING IN RELATION TO NATIONAL HEALTH.

Prof. LEONARD HILL, M.B., F.R.S., said he would like to make some remarks by way of amplification of what previous speakers had told them; and he drew attention first of all to some facts with regard to the condition of health in this country. There was, he pointed out, sixteen years' difference in the expectation of life in a city like Manchester and the healthiest towns of the country. The average age of death of those who survived the age of 15 was 67 in purely agricultural districts, and 49 to 50 in purely industrial areas. More than twice the number of children died under five years in industrial than was the case in rural districts. The last two speakers referred to the fall of dust that coal brought upon us. He would draw attention to the extraordinary folly of cutting-out from our lives the radiant energy of the sun, which was the origin of all the activity of life on this globe. When one came to explore the conditions existing in our houses and workshops, they were found to be very far removed from the ideal. The conditions were too often just those that resulted in warm, moist air, which was the opposite to what he would like to see.

How were we to heat our houses so as to get a cool moving air (which was the fundamental thing needed), together with nice warmth—radiant heat, if possible? This was the trouble—to get radiant heat, without smoke, and cool, moving air. The wood-fire became a coal-fire, and the coal-fire had now to become a gas-fire. If they were going to have radiant energy, it must be the radiant energy of the gas-fire, which had extraordinary economy. The desired saving in coal was secured by using a gas-fire, the pall of smoke was lessened, and the radiant energy for which he asked was obtained. One could sit in front of a gas-fire, and at at the same time have such ventilation in the room as would maintain a flow of air. The alternative was the anthracite stove or hot-water coil, which heated the air; and for economical use all the windows had to be shut. The warm air became too moist; and this was a state of things that should not be. The only way he could see of attaining the desired end, along with coal economy, was by a modern radiant gas-fire.

As to this fire, it must be a properly constructed, scientific gas-fire, which took away all the fumes. There must be no escape of fumes into the room; and it should be made as mobile as possible in the matter of reducing the radiant energy. Care should be taken not to put in a gas-fire which would overheat the room, because this was disastrous. He thought a gas-fire should be constructed so that, supposing it consisted of twelve radiants, it should be possible to turn them off so as to have alight, ten, eight, six, four, or even two. In this way, the heat could be adjusted exactly to the conditions of the day. The trouble of this climate was that the conditions are so changeable; and the difficulty with steam-coils and things of that kind found in factories, workshops, and rooms, was that often nobody attended to them, and they went on working at full pressure, just as much on a warm day as on a cold one, and people worked in overheated depressing atmospheres, to the great detriment of their health.

HYGIENE OF GAS AND ELECTRICITY FOR LIGHTING.

Dr. SAMUEL RIDEAL, F.I.C., delivered the last address. He remarked that he had been asked by Mr. Goodenough if he would say a few words about the experiments he carried out some years ago on the question of the hygienic effects of gas and electricity for use in small living rooms. The matter was of much importance at the present time, not only from the coal conservation point of view, but also in connection with the housing schemes. Since the time of his investigation, metallic filament lamps had been introduced; and there had also been alterations in the heating value of the gas used, and improvements in mantles. The chief difference one noted in the two forms of lighting was that with the electric lamp there were no products. There was heating; but when one measured the quantity of heat from a metallic filament lamp in relation to its light, it was found that a gas lamp gave more heat than the corresponding electric lamp. A light of 50 candles produced by electricity, with carbon filament lamps, gave 658 B.Th.U. per hour; 50 candles produced by the gas we used to have gave about 1382 B.Th.U., or twice as much.

The burning of gas was accompanied by the production of considerable quantities of carbonic acid, water vapour, and other substances, which at first sight one would expect would prejudicially affect the composition of the air of a room used for dwelling purposes. But the gas-lamp acted as a ventilator. Its products would ascend, and tend to draw with them the products from the human beings in the room. Therefore, notwithstanding the products from gas, it was an aid to ventilation, and improved the quality of the air in an inhabited room. The smaller the room, the more important did it become to ensure ventilation.

Then, again, the organic matter in the air of a room was destroyed by the burning gas. Another important effect produced by a gas-light in a room was the destruction of the sulphur. The sulphur in the gas itself was completely burned by the mantle, and formed small quantities of sulphuric acid. There was no sulphuretted hydrogen in coal gas, but there were sulphur compounds; and there had been great discussion as to whether or not these should be taken out entirely. But the small quantity of sulphur present in the gas was beneficial, as it conferred a sterilizing property on the air passing through the gas-flame. He found repeatedly that the air which was passed through a gas-flame in a room had been sterilized—partly by the heat, and partly by the sulphur gases that were oxidized by the mantle. The cremating effect of the gas-burner, and the sulphur essences in the gas, were contributing to the improvement of the air in the room. This was a distinct advantage, which ought to be pressed home by people interested in the gas industry, especially at the present time. It was, he thought, very important they should realize there was no doubt whatever that there were advantages accruing from heating by gas over coal-fires and electricity.

Dealing with his experiments, he said that, if gas were burnt in an air-tight box, with sides of some non-conducting material, the oxygen would be quickly exhausted, and the products would accumulate to an indefinite extent. These conditions are not, however, even distantly approached in any actual room, since there is always an active and continuous interchange of air, and heat is freely conducted and radiated through walls windows, and ceiling. By reason of their massive construction, the rooms used for these experiments were more nearly air-tight than any ordinary living room is likely to be, the rate of ventilation through the walls being only one-half of that noted by Pettenkofer in his own house. Notwithstanding this, and the special precautions taken to prevent the ingress of further air, the composition of the air under gas illumination showed no marked difference from that under electricity, and the condition of the room as regarded heat was practically the same under both illuminants. With natural ventilation, the proportion of carbonic acid in the air was practically identical for both illuminants.

A VOTE OF THANKS.

Sir GEORGE DAVIES (the Vice-Chairman of the Bristol Gas Company) said they were much indebted to the four speakers for the scientific truths they had given them. While they were meeting as the British Commercial Gas Association to consider the

business side of the industry of which they were bearing the responsibility, it was a most excellent thing that scientific men should tell them of the benefits which accrued from the proper use of gas. He moved a hearty vote of thanks to these gentlemen for the interesting manner in which they had put before the meeting what he could only term profound truths.

Mr. F. W. GOODENOUGH (as the Chairman of the Executive) seconded the vote. He said the Association did endeavour in all its work to bear in mind the duty of the gas industry to be of public service in every sense of the word—not merely to consider the commercial side, but also the way in which, in the conduct of its business, it could be of service to the community which it had the privilege of serving. They had listened to most weighty arguments as to why gas should be used in the houses to be built, both for fuel purposes and for lighting. Local authorities any way would find, he believed, that the working woman would ask for gas-light, because of the slight amount of extra warmth it gave as compared with the other illuminant. This was of importance in households where every penny counted. There was also to be considered the extra cost of dual systems of mains for electricity and gas. He thought the gas-works of the country might look for a doubling of their output in comparatively few years, by the conversion of the public in increasing degrees to the scientific use of coal—as a gaseous product.

Dr. SALEEBY, in reply, said we were in the remarkable position that the national interest—national economy—required a form of use of coal which individual economy often made prohibitive. This was a profound dilemma. What were we to do? He suggested to the Government that the dilemma was a case for statesmanship. Their fundamental duty as statesmen was to conserve the health and the wealth of the country; and they must perform it in some such way that the individual could do his or her share, which was at present practically impossible for reasons of money.

THE POLICY OF TRADING WITH THE CENTRAL POWERS.

By SAMUEL CUTLER, JUN., A.M.Inst.C.E.

[A Paper read before the Society of British Gas Industries on Thursday, Oct. 30.]

One of the most important questions of the hour, I think I can say without fear of contradiction, is: Are we to trade with the Central Powers? Much hesitation, I am afraid, exists in the minds of most of us as to the desirability, and also the ethical propriety, of renewing trading relations with our late enemies. It is necessary, however, to consider the issue broadly in the light of the world's present economic position as it exists—the result of social and industrial upheaval following upon the greatest war that mankind has, or ever will, we hope, experience.

During the momentous years of the war the whole British Empire has shown a wonderful steadfastness in the patriotic display of loyalty to King, Country, and Flag—bringing the war to a victorious end, thereby saving our country, and all that it contains and implies, from stark, staring ruination. The fields of battle are now, however, changed to the fields of industry and practical politics; and we, the foremost nation—having happily emerged from the world's conflict with our soil intact and our industrial facilities not only untouched but vastly improved—must seek to initiate the policy, and lead the way out of the state of chaos which for the time being is so evident on every side.

Now I venture to inquire how many of us have studied in any degree of detail the terms, and more particularly the commercial clauses, of the Peace Treaty of Versailles beyond noting with satisfaction the new lines of frontier boundaries, the probable amount of the indemnity, the disposal of Germany's accumulation of military, naval, air-force armaments, war stores, and the like, and the loss of her colonies? We may, I believe, dismiss from our minds at once all military considerations, because, however bellicose our late enemies, and Germany in particular, may feel in the future, it is next to the absolute impossible for that nation to attempt hostilities for generations to come, for the paramount reason that, owing to the restoration of Alsace-Lorraine, with all its mineral wealth, Germany can no longer meet the production of iron ore which modern war as we understand it entails. The retrocession of these provinces is one of the chief accomplishments of the Peace Treaty, and constitutes a lasting industrial advantage to France and an enduring preventative measure against German aggression.

During the war, in 1917, I referred, in the short paper I read before you, to some figures relating to the iron and coal fields of Lorraine, which Germany had wrested from France in previous wars, and which indicated the remarkable extent to which these resources enabled Germany to develop the foundations of her supreme position and industrial strength at the opening period of the war. To-day's position justifies a repetition of these statistics; for France now replaces Germany as the possessor of the dominating iron ore supplies in Europe. The annual production of iron ore in Germany before the war was 27 million tons, and in France 21 million tons; whereas Germany can now only produce 7 million tons, as against France's 42 million tons. A far swing of the pendulum is it not?

A further industrial obligation Germany has undertaken in subscribing to the Peace Treaty is the necessity to furnish with priority over all other supplies something approaching 250 million tons of coal, spread over the next ten years, to France, Belgium, and Italy; and these countries are all counting upon this supply of coal or its coke equivalent to save their industries. Germany also loses to France the Saar Coal Mines, previously producing about 17 million tons per annum; and as these mines were never worked to their fullest extent, in order that the supply should not compete unduly with the Westphalian mines, it is of all the greater significance.

A commercial asset of no mean importance which France also obtains by a condition in the Peace Treaty, and which deprives Germany of one of her many ambitious industrial plans, is the transfer of the port of Strasbourg—a result which now gives France direct access to the Rhine. This river port, with a pre-war traffic of close upon 3 million tons per annum, and already fourth in importance of the Rhine shipping towns in the midst of a network of canals and railways, is to be enlarged to cope with an anticipated vast increase of traffic. In connection with this considerable gain, the Peace Treaty provides against harmful competition from the trans-Rhine port of Kehl, which, although in German territory, is to be administered by France for a period of years, by the end of which time Strasbourg should have gained an ascendency difficult to be ever approached by Kehl.

The treaty also provides that Germany furnishes France during the next three years with about 100,000 tons of benzol, a like amount of sulphate of ammonia, and 150,000 tons of coal tar. Again, she hands over one-half of the whole stock of dyestuffs and chemical drugs existing in the country at the date of the treaty, and then for five years a quarter of the whole German production of all such dyes and chemicals for a period of six months in each year.

In addition to ceding to the allies practically all her ships—including the large ocean passenger steamers which formed so important a feature of the German mercantile marine—she is compelled to build for the allies at the rate of 200,000 gross tonnage for each of the next five years. Another important clause provides that manufactured products originating or coming from Alsace-Lorraine shall, on importation to Germany, be exempt from all custom duties during the forthcoming five years—a condition also applying to Luxembourg and Poland.

Now, omitting reference to the gigantic obligations imposed for reparation, compensation, penalties, and indemnity, I have briefly instanced some of what may be called the minor Peace Treaty terms affecting the outlook of Germany's industrial future, and which are of particular concern to us in considering the question, If we trade with Germany, are we assisting her to regain her former position in the world to our own detriment? Germany's financial indebtedness alone is sufficient to impede reinstatement to her former status within measurable time; and there are many other retarding factors—such as her own internal war losses and costs, and the further fact that she is experiencing even greater trouble than ourselves in labour disturbances and unrest, vastly increased wages, reduced hours of work, and less efficiency in the skilled worker, while labour has gained a new position through trade unionism which no doubt it will endeavour to hold. Thus a blow has been struck at Germany's industrial progress and future prosperity, which, in my opinion, removes the fear of a renewal of her pre-war practice of peaceful penetration and excessive competition for many years to come. We have it on the authority of the British Chamber of Commerce in Germany—an institution established to control the exchange of trade between Germany and the British Empire—that she is not in a position to dump, even if desirous of doing so; there being in point of fact only very small stocks existing in that country to-day. Indeed, all over the Continent generally there is a dearth of the prime necessities of industry following upon a period of semi-starvation which existed during the greater part of the war.

The cash securities, goods, and materials do not exist to-day to discharge all her debts and liabilities which are to endure for a period of thirty years or more; and whether it shall be with us or with other countries, her trade will have to be carried on and money made. Therefore, to forcibly push her over the precipice upon which she now stands does not seem to be a policy calculated to advance our own business interests.

The Peace Treaty does, in fact, provide for an immediate resumption of trading relations, especially between France and Germany. The shipping, coal, coke, tar, dyestuffs, chemicals, and all other commodities I have referred to are to be supplied at prices ruled by a schedule already determined by the treaty. France is already crying out because Germany is failing to sell her the coke for use in the blast-furnaces of Lorraine. Indeed, the French, according to one of her statesmen, are taking bold lines in the matter of trading with Germany—they evidently realizing that dreams of keeping that country in economic impotence is harmful to their progress.

Our Government have recently contracted for 20,000 tons of potash, and shall we not take delivery of the new shipping which Germany is laying down to our order? Thus there appears to be a good deal of truth in what the Editor of the "Economist" said the other day: "It is not a question of shall we trade with Germany—we cannot help it." A number of Americans seem to have realized this fact, inasmuch as interests in German factories have been secured by their enterprising citizens, who evidently realize that advantages are to be gained in the re-establishment of industries over there. Further, I understand British firms are also to

some extent appointing agents in Germany for British manufactures.

The object of my remarks to-day is not, however, solely a consideration of the reopening of trading relations with Germany in particular, except in those channels where necessity compels us so to do in order to supply our wants, but also to examine a kindred subject—namely, the policy of unrestricted importation of materials in general into this country. France, although having suffered untold wrongs and devastation, will, when reparation is completed, have opportunities and resources which I hardly think either she or others have hitherto contemplated. She is the nation likely to become "The Competitor," for example, so far as steel production is concerned, as, with the acquisition of Lorraine and the Saar Valley, France will be capable of increasing her production of pig iron from 5 million tons to 11 million tons annually—thus exceeding the United Kingdom output at the period immediately preceding the war. Belgium, too, will, in the course of time, be resuscitated; and although not acquiring, like France, additional territory with mineral wealth and highly-developed industries, she will no doubt at no distant day be in a position to renew her exports of steel and other products to this and other countries. For the time being, however, her industries are in a deplorable state.

The report of the British Commission recently appointed to visit and investigate the condition of plant and machinery and the prospects of reconstruction and development of the iron and steel industries in France, Belgium, and the occupied German territory is a most instructive document, and should be studied by everyone interested in the subject we are discussing to-day. The Commission point out the fact that of 60 blast-furnaces existing in Belgium before the war, not one was in blast a few months ago; and it will take twelve to eighteen months to get even half of them to work again. Unemployment is appalling, over 60 per cent. of the workmen being out of work.

From personal observation during a recent visit to France and Italy, it was only too evident to me that those countries were also experiencing, with ourselves, troubles of labour unrest, only in far graver forms, with even lesser output compared to our present low scale. The cost of living being far higher than we experience, brings its attendant confusion and strife—in fact, our grievances are nothing compared with the outbursts of discontent on the whole Continent. So far as we can gather, America is drifting towards the same conditions of labour ferment, commencing with threats of, and actual, strikes on a scale fully commensurate with American methods.

I thus conclude that the relative position of each country, so far as economic conditions are concerned, is proportionately the same as existed before the war, and only altered in the degree of monetary value brought about by a universal shortage and continued under-production. It is, of course, impossible, when endeavouring to seek a means of arriving at a solution of the present question, to avoid that old controversial subject—Free Trade or Protection. In reviewing the state of the World's economic affairs created by the war, I am led to believe that Free Trade is still the broadest and surest foundation for this country's prosperity. Before the war we enjoyed the largest international trade in the world. Our sale of exported manufactured goods averaged £9 per head of our population; Germany's exports were £5 10s.; France's £4 10s.; and the United States, £2 10s. *per capita*, from which I can assume our trade was in a healthy state, and did not call for any drastic modification of our fiscal policy.

The majority of the members of this Society are associated with constructive engineering—an integral part of one of our master industries—and are thus closely interested in the question whether our steel and metal markets are to be opened to foreign supplies, either in their raw or manufactured state, on a free or tariff basis, and in restricted or unrestricted quantities. Hitherto there have been unrestricted free imports of steel sheets, plates, and sections. Most of us made good use of the opportunities thus afforded, and for quite a considerable period many of the steel structures in this country were to a large extent built-up from raw Belgian and German materials; the cost of this class of work reaching its bottom level under these conditions. A form of protection arose by engineers specifying the exclusive use of British materials, which did not tend to lower costs. It is a question whether this condition of contract should be continued, in view of the shortage of home produced materials, always remembering that the law of supply and demand is as potent to-day as ever—a fact practically demonstrated by the inadequacy of the present-day's under-production and over-consumption to meet the increased requirements of the wider distribution of wealth among the populace occasioned by war conditions.

I am aware that a special trade followed by one group of our members has since the war convinced the Government that absolute protection is necessary—the special circumstances surrounding the manufacture of gas-mantles being apparently such as to warrant prohibition against importation of inferior articles. The toy and motor-car industries, which likewise approached the Government for restricted importation of foreign goods, are in a different catogory. It would seem, moreover, that the car manufacturers are somewhat too ambitious. Already protected with a tariff of 33·1-3 p.ct., which, in effect, is much greater taking into account the higher scale of freights, insurance, and handling and the rate of exchange, with an overflowing order book, and a hopeless inability to fulfil the present demand, they yet seem prepared to deny to the business and professional man reasonable facility for using a modern means of conveyance rather than be subject to that sobering and levelling influence on prices—unrestricted importation. Surely this is an example of where protection is harmful to the interests of this country's general progress.

The supply of labour is lamentably short—not measured so much by counting human beings as by the degree of willingness to produce an honest day's output. A member of the Government has stated from evidence that, with the reduction of the working hours, the reduction of output has been found to be in mathematical proportion. I go further and say the output is considerably less, and still further diminished by the daily occurring strikes, which means ultimately that, unless productivity can be increased, we shall be in danger of declining below the standard necessary for maintenance of healthful life and result in a political, industrial, and social disorder hitherto unexperienced in this country of ours.

I take it all are agreed that the most essential requirement is production—that is, the product of the working man; and we, their masters and employers, as prime controllers of this production, hold for the time being the position of trustees to the nation to lead affairs into their legitimate path again. All the members of this Society are employers of labour, and control what I term for the moment establishments of production whose combined capital is not less than 20 million sterling; and thus we are shouldered with grave responsibilities, requiring us to take the broadest views in seeking means to augment the trade of this country. A vast amount of literature has been written and widely circulated since the armistice expounding a variety of views on reconstruction—as to what ought to be done to set the old country on its feet again. But although the man of education does to some extent derive assistance and guidance, the advice in its present form does not reach the working man, or, where it does, the effect is too frequently lessened by involved arguments, deep and abstract reasoning, and the lack of lucid convincing exposition.

Now carry your minds back to the early days of the war. The working man was invoked, and his best side shone-out in response to those simple, effective, recruiting appeals displayed on posters and placards and elucidated in brief platform speeches, with the result that the voluntary army, which preceded conscription, was raised with a spontaneity unparalleled in the pages of history. Thus it occurs to me that a simple policy of stating plain and unvarnished facts is now required as a Government propaganda of educational work to bring home to those concerned the grim realities of the economic situation, and make the worker acquainted with fundamental economic laws.* I believe the working man himself is quite open to reason, and ready to do the right thing if only shown what that right thing is. Let the worker be told both sides of the question, and not left simply to what his Trade Union leaders, with catch phrases and epigrams, instil into his mind, already distracted at the moment by the ease of high earnings and the knowledge of accumulated union funds, besides realizing his position in forming an integral part of the uncertain supply which is failing to meet the nation's imperative demands.

The fact that three consecutive resolutions were passed unanimously at the recent Trade Union Congress, involving an additional burden of £650,000,000, or one and a half times the net burden due to the war, characterizes the inability of the working man to realize the financial significance of the resolutions. And yet they strive to hold the destinies of this country in their hands! One of these resolutions referred to the 44-hour working week. Yet I read that in Germany, despite the increased wages and the regulation eight-hour day arranged by their unions, the working man who knocks off early in the afternoon takes on private orders and works for himself from that time onwards, under less efficient surroundings—thus indicating that, at least in Germany, necessity compels the producer to desire useful occupation for more than eight hours out of the twenty-four.

The Economic Council are now issuing some interesting statistics in their monthly bulletin; and last month one learnt the ugly fact that the production of crude steel in Germany showed a large increase during the past three months over the previous quarter, and in this country a diminishing series practically coinciding with the German increases. We must acknowledge, however reluctantly, that the power of production of the German states cannot be ignored, and that we have to reckon with in the immediate future, willingly or unwillingly, the potential products of over 120 millions of population comprising the Central Powers, who, by their geographical position, have exceptional export facilities by the direct railway communication to the greater part of Europe by reason of contiguous frontiers. The period immediately preceding the war marked Germany's cumulative height of progress; but it is well worth consideration whether she could have maintained the high-water mark level to which the flood of apparent prosperity had carried her. Not a few have expressed astonishment—and it is a riddle I have never seen satisfactorily answered—why Germany instigated the war at a period of her history when she was regarded to be fast approaching her desideratum of being master of the world's commerce.

* Since these lines were drafted, the great railway strike has taken place, and undoubtedly the settlement was greatly facilitated by the making clear to the public and strikers alike, by the publication towards the end of that fateful week in simple form the comparative tabular standard of wages, the *primâ facie* point of dispute: and, more recently still, I note that Messrs. Marshall, of Gainsborough, have adopted a policy in the same direction by the issue of a circular-letter to their employees setting out in terse sentences what the worker ought to know.

In this matter one's view-point is perhaps limited; but it has occurred to me, whether Germany's highly developed commercial organization and the super cartellization of her industries, which often promoted export at the expense of the home market in an artificial and arbitrary manner, had not been over-reached, and financial difficulties were in sight. The cartel system was openly acknowledged in Germany, and was upheld and fostered by the Government as a means of expanding the country's export trade. But whether this as a system is to the permanent advantage of the whole nation is another, and very debatable, matter. Turning to published information, it appears that, as far back as 1905, there were over 12,000 manufacturing firms working under the absolute control of 385 cartels. The general method of working appears to be that each firm has allotted to it a specified production for home consumption, and is only allowed to exceed this on the condition that the surplus is sold to foreign countries—a bounty being paid to the manufacturer, where necessary, in order to enable him to compete abroad. Thus the foreign country buys cheaper than the home consumer.

I will instance a case reported by our late Consul at Frankfort. The cartel of wire nail manufacturers made in six months a profit of £60,000 in the home market, and a loss of £43,000 on their foreign markets—the home consumer suffering under the hardship by the cartel's agreement with the wire rod cartel to supply no material to a manufacturer of nails who did not belong to a cartel. An instance referred to by Mr. Marshall, in his "Industry and Trade," is particularly interesting to us, and indicates the octopus hold and power of these cartels in Germany. The German manufacturers tendered for a large gasholder at Copenhagen, and were undersold by a British firm making use of German steel at low export prices. The loss of the contract was regarded as of such importance to the Steel Works Union—one of the most powerful cartels in Germany—that it forthwith changed its policy, and no longer made uniform reductions to all countries, but put England and Belgium on a differential footing. The case of potash is another interesting example of the operations of a cartel; it being, I believe, the single case of a cartel's export price being above the home price—the German Government stipulating that the home price for this much-needed fertilizer must be low, the export price being where it will.

The protection of individual firms afforded by these cartels under the extraordinarily far-reaching conditions with which they are operated in Germany, and the suppression of individualism it represents, has hitherto been acquiesced in by the Germans as a consequence, no doubt, of the discipline ingrained in them from their youth upwards under the late military *régime*. But the result of the war is bringing about a social reconstruction; and the outbursts of discontent which followed its cessation can be partly attributed to the exploitation of the masses of the people by a dominant few through the agency of cartels. If prophecy were not a gratuitous folly, I should feel inclined to say that ere long Germany will reconsider her present zollverein policy, and approach more towards a state of free trade, when it is fully grasped by the masses that a system of protective tariff gives a bounty to the German producer at the cost of the German user; and, further, a reaction not altogether favourable to cartels is likely to develop, inasmuch as the one gives the opportunity to the other in a tariff-bound country.

"The strong individuality which created Britain's industrial leadership is still her most important asset, but it needs increasingly to be supplemented by readiness to co-operate with others in large affairs; while the supersession of small businesses by large in many industries is inevitable." These are the words of Mr. Marshall, in his recently published work on "Industry and Trade;"* but they epitomize tersely and lucidly what I endeavoured to express in the debate which followed Mr. Main's address on the occasion of this meeting last year.

While maintaining that to ensure progress we must preserve sufficient individualism to provide the initiative and incentive that are the outcome of self-interest, I do not desire to underrate the advantages of consolidation, co-operation, or amalgamation. But what we, as leaders of business, should keep in mind is the inequity of organizing or combining to the point at which a section can exploit a nation. Such a condition can never permanently endure, whether its authors be trade organizers or trade unions.

My address was opened with the question: Are we to Trade with the Central Powers?" I followed with an endeavour to indicate the economic position in which Germany, the predominant partner, saddled with obligations arising out of the war, stands to-day; and I have also tried to throw a little light, as I see it, upon the conditions under which she previously traded. I hope your discussion will provide an answer.

DISCUSSION.

Mr. J. H. BALFOUR BROWNE, K.C. (speaking before the paper was read, as he had to leave to keep another engagement), said he had had only a few minutes in which to glance through the paper. It was an exceedingly interesting one. He found in it advocacy of the policy of unrestricted importation of materials in general into this country; and further on was this remark: "The majority of the members of this Society are associated with constructive engineering, and are thus closely interested in the question whether our steel and metal markets are to be opened to foreign supplies, either in their raw or manufactured state, on a free or tariff basis, and in restricted or unrestricted quantities." Laurence Sterne, notwithstanding that he wrote "Tristram Shandy," was a clergyman. Once he went into the pulpit, and gave out his text, and then said: "That I deny." "That I deny." Was it of no importance to the members of the Society that there should be an unrestricted import of raw materials and manufactured articles into this country? He said "No." With regard to raw materials, they were at one with the author. If there was restriction of raw materials, trade would be crippled. If they restricted the import of manufactured articles, they protected what must be protected—labour in this country. We could not have here cartels and trusts as in other countries; and it was impossible to go on paying wages unless there was some protection of the labourers of the country, and those who employed them. This raised, as Mr. Cutler pointed out in the paper, the whole question of free trade and protection. He (Mr. Balfour Browne) still held that protection in this country, which was labouring as an industrial country to produce goods annually for itself and the world, was essential if they were to have success. It would not do to "throw open the doors." The great economist, John Stuart Mill, said in his book on "Political Economy" that for a time infant industries might be legitimately protected, in order that they might take root in the country and flourish. He (Mr. Balfour Browne) had never understood, and did not understand, why it was, if infant industries could be legitimately protected, that established industries should not be also protected. This was why he differed from Mr. Cutler in his paper. He hoped the question would be decided by the country in the way he had indicated.

The PRESIDENT (Sir Arthur Duckham), at the close of the reading of the paper, said they congratulated Mr. Cutler and themselves upon his very fine paper. Some thought and courage were required in producing it. The subject was a thorny one, if they started on a broad discussion of free trade and protection. One point to which he (Sir Arthur) would like to draw attention was the reference to potash. He believed the reason for the export price of potash being high was that Germany was practically the only producer; and so it did not matter to her how high the price was at which she sold it abroad, so long as she got it cheap for her own fertilizing purposes. Another point was that they had a sore place in the entity of Europe and the world to-day. This sore place was in the Central Powers. They had to make the sore place of Germany into a healthy place in order to secure the success of the world. This was a necessity for them all as citizens of the world. Unless we did get a prosperous and more or less happy Germany, we should not, so long as this existed, be a prosperous and happy nation. This was the fundamental position they had to bear in mind. He had been a free trader from his birth upwards. It was the only political belief he had ever held. He did not like to be dogmatic on any subject, because on every subject every individual had to make up his mind for himself. Undoubtedly, the suppression of industry by illicit dumping in this country should be stopped; and they should protect their industries against which a dead-set was being made. Some might need fostering; and after that the more competition the better. They would all then strive to do better work and the cheapest, because somebody else was going to compete against them. Look at what a blessing electricity had been to the gas industry in this way, and how tremendously it had helped it. He would ask his friend, Sir William Jones, to start the discussion. He was the head of a Commission who went over the Lorraine ore fields; and he had formed a fair opinion of the position of Germany and France in respect of iron and steel production.

Sir WILLIAM JONES said, as Sir Arthur had stated, he was chosen (why he never could understand) to take charge of the British mission which visited the restored provinces of Alsace and Lorraine and the Saar Valley, to report to the Ministry of Munitions and the Board of Trade upon the then condition of the iron and steel works in these areas, as well as upon the steps that had been taken in the areas in regard to the output of munitions during the war, and the possibility of the iron and steel works in them becoming serious competitors or otherwise with this country in the days of peace. Mr. Cutler had evidently read this report; and he (Sir William) was glad he considered it would be of some value to this country. He might give his answer to the riddle that Mr. Cutler had submitted by saying that he believed the iron ore fields of Lorraine were the cause of the war of 1870. He believed also that the iron ore fields of France which Germany did not possess were partially the cause of the war of 1914. The development of the iron and steel industry by Germany, and its vast value to the country, had caused her to look with envious eyes to the remaining ore fields that then belonged to France; and she wished to acquire the whole of them. She had failed, and lost the bulk of what she gained in 1870. The position of France now became almost that which Germany occupied before the late war. In other words, France now possessed vast ore fields—the largest basic ore fields in Europe—greatly beyond her own home needs for any length of time. But France suffered from the misfortune of not possessing, as Germany did, the coal-fields that were necessary to enable her successfully to work the ore fields. They saw France to-day dependent upon the Westphalian coal-fields for the coke she required for the purpose of smelting the ore found in Lorraine. This, he thought, was probably the answer to the question that Mr. Cutler had raised that day. The position of France was that she, to some extent, took the position previously held by Germany; but he did not think this would at all deter Germany from advancing year by year in her output of steel. He did not believe that Germany was in this respect any worse placed than this country. A statement had been made that high freights were a protection to this country. He demurred entirely, because this country was dependent, so far as the iron and steel trade was concerned, upon the importation of foreign ores. Therefore she should get them at low freights. The basic ores in this country only carried about an average of 26 to 27 p.ct. of ore, whereas the basic ore to which Mr. Cutler had referred in his paper gave something like 52 p.ct. The Germans, when they possessed these ore fields, had great iron and steel works alongside them. They laid down blast-furnaces, and had the steel works adjacent; and they utilized every foot of the waste gases obtainable from the blast-furnaces for running the steel works. He visited one works where they produced 9000 tons of pig iron and 7000 tons of finished steel sections per week, and only used 40 tons of coal per day—the rest of

* "Industry and Trade," by Alfred Marshall. Published by Macmillan & Co.; 1919. A Study of Industrial Technique and Business Organization.

the power required being got from blast furnace waste heat. This country had to learn some valuable lessons in this regard that Germany had taught them in these iron and steel works that had now been ceded to France. The present condition of the works out there was anything but satisfactory. The labour troubles were very real. Indeed, their troubles were certainly much worse than here. The difficulties of transport were immeasurably greater; the conditions of the railways in Central Europe were in far worse state than here. Generally, they had not in this country much to fear for some years to come from competition either from Germany or France, because it must be remembered that a great number of the most important steel works which formerly belonged to French shareholders had been ruthlessly destroyed by the Germans; and, until these were reinstated, the fear of severe competition from those countries must clearly be somewhat remote. He should, of course, have liked to have had a deferred opportunity of discussing the important basic principles dealt with in Mr. Cutler's paper. He might say that he could not go so far perhaps as Mr. Balfour Browne in pronouncing against the importation of semi-finished materials. He was in favour of the importation of raw materials, and had been instrumental in getting the steel makers of this country to order 45,000 tons of basic pig iron from steel works in Lorraine, which happened to be in stock, and which the Lorraine works could not use, because they were not getting furnace coke from the Germans. They were not sending the coke to Lorraine which they had undertaken to do, and so the iron in stock could not be utilized in the steel-works, as the ore was not being smelted at the time—solely owing to want of coke. Nearly all the steel made over there, it was generally known, was by the Bessemer basic process; ours, was made by the basic open hearth or the acid open hearth process. The view he took was that this country above all countries must be dependent upon her exports for her prosperity. They could not live upon themselves. This country more than any other of which he knew had to depend upon her exports with which to pay for her imports, which were necessary for the maintenance, upkeep, and feeding of the population. The real truth was this: So far as prosperity went, they had to look all the time to the high skill of their workmen to carry on the superior business and the scientific execution required by the employers to hold their own in the markets of the world; and it was a very debatable point whether the importation of finished material should be permitted, while one would agree with the duty free importation of raw materials. It seemed to him that the very instance that Mr. Cutler had quoted, of a British firm having successfully competed against the Germans for the gasholder at Copenhagen, where it was intended that German raw material should be used, but with British labour, in itself showed that the pre-eminence of this country must depend upon the superior skill both of her workmen and her employers. He expressed his personal thanks to Mr. Cutler for the paper.

Alderman F. Templer Depeee remarked that Mr. Cutler began his paper with a conundrum, and finished up with one. He had hoped that Sir William Jones would have answered the question whether or not he thought they should trade with Germany. Personally, he thought this was a matter one could hardly expect to sum up either at a single meeting, or even after a deliberation of some weeks. Mr. Cutler principally touched on the economic side of the question; and if they were discussing it as business people, and were looking at the economic side of it, then he thought there was only one answer—that if it was going to assist this country's trading, then they should deal with Germany. The British always looked upon the practical side first. He must confess that, with the enormous indemnity that Germany had to face, he could not see, if her trade was shut-off from the other countries of the world, how she was going to satisfy the indemnity. There they had a very sound basis upon which to go. The Allies wanted the money, and that badly. It did not appear to him that Austria was in any better position than Germany; and if the Allies were to secure payment, then trading with Germany was bound to come. In business they had, to a great extent, to let the sentimental side go, and look upon matters solely from the practical side. The only question that arose in his mind was, If they began to trade with Germany, where was it going to stop? If they allowed their raw material to come in, well and good; but if they allowed every manufacturing firm with finished goods to come in, British trade was going to suffer. They had before the war experience of the insidious way in which the German worked into British trade; and if they began to trade freely with the Central Powers again, they were going to subject themselves to a lot of this business. He was still doubtful as to whether or not, or as to how far, they should trade with Germany.

Mr. J. W. Scott pointed out that, during the past few years, they had had a good deal to do with Government Departments; and he thought that protection would lead to establishing more Government Departments, which would result in much interference with trade. It was questionable whether under such conditions they would not lose more than they would gain. His feeling was that the less they had to do with Government Departments, and the freer they were, the better it would be for the country, themselves, and business progress.

Mr. F. C. Tilley said this was a subject that had worried manufacturers very considerably. Early in the war, most people made up their minds that the less they had to do with those who were their enemies, the better it would be for the whole country; they had felt very strongly that the Germans were people with whom they ought not to have any dealings. Conditions had altered very considerably since the Armistice. Probably the members at the meeting that day were of the same mind as he was. They did not care to say straight out they would deal with Germany and the countries allied with her, because that might be considered to be somewhat unpatriotic. This had prevented a good many expressing their opinions. At the same time, no one came forward, except Mr. Cutler, and stated quite strongly that people here should be free to deal with Germany. Some time ago he had, as mentioned in the Chairman's report, something to do with the suggestion made to the Board of Trade that imports from Germany should be considered by a committee appointed by the trades of the country, in conjunction with representatives of the people and of the Board of Trade, who should represent the purchaser of anything required for use by the people. It seemed to him that on these lines, they could deal with Germany. They should be able to make arrangements, without too much supervision and control by Government Departments, for British trades themselves to represent their views before some central body prior to goods being allowed to come into competition with them. Arrangements might also be made for the fostering of certain specified trades in this country; and, further, the committees might have control of the amount of imports, and the conditions and prices at which the imports should enter. He thought a great deal of good would be done in this way, because the traders themselves would have to show that they were doing their best to build-up particular trades, that they were selling at a fair price, and that they were organizing their businesses on lines that would allow them to produce at the lowest possible price. If the traders could not meet the demands of the people, the country should not go short of what it needed; and imports should then be allowed, and the populace have what was necessary.

Mr. A. C. Beal said the question Mr. Cutler put was, "Are we to trade with Germany?" The answer was: "We cannot help it." There were 120 million people in Central Europe; and nothing that this country could do would keep them from trading in some way or other. As one of the largest trading communities in Europe, this country would have to trade with Germany. Another point was with regard to free trade and protection. Mr. Cutler had said that the pre-war exports from this country amounted to £9 per head, against Germany's £5 10s. He thought this large export per head was due not to the manufacturers of this country, but to materials that were imported and then exported. This being so, it was a fictitious figure. Another point which would have to be considered was this. Sir William Jones told them that the iron ore in this country gave about 25 p.ct. of iron, while that of Lorraine gave a percentage of 52. It would be impossible for the iron and steel manufacturers of this country to compete with the foreigner under such a disadvantage; and so there must be some measure of protection if they were to keep the trade in this country.

Mr. Cutler, in reply, said he was much obliged for the way the members had received the paper. He thought perhaps he ought to say it was a matter that required a good deal of looking up, because all the figures, statistics, and information he had quoted had to be obtained from various documents. Mr. Balfour Browne took an entirely different view from himself. When one wrote a paper, and it was criticized, one felt that something had been said that was interesting to the people who read it. He was much relieved to find that, although one of the Past-Presidents had such strong views opposed to what he held himself, their present President was a free trader. He did not think many subjects had been raised during the discussion that called for any direct answer, except perhaps in the case of the last speaker, who raised a point on the figures regarding the export trade of this country. His authority was the Prime Minister, who quoted the figures a short time ago—£9 and £5 10s. With regard to trading with Germany, he had endeavoured to put before the members, without expressing any very decided opinions on the subject, what were the facts. They, as business men responsible for the trade of this country, should know the conditions under which Germany found herself to-day, and how she stood before the war. In 1912, Germany exported to this country alone goods worth 70 millions sterling. Out of this, something approaching 12 million pounds' worth were goods supplied to the engineering and allied industries. It was for them as engineers to consider this question very seriously, if they were to strike out at one blow the imported materials of Germany. If the Germans traded with this country, this country must trade with Germany.

THE BROMLEY-BY-BOW GAS-WORKS.

Visit of the London and Southern District Junior Gas Association.

The Association had their first visit of the present session on Saturday afternoon, when between sixty and seventy members assembled for an inspection—facilities for which had been kindly granted them—of the Bromley-by-Bow works of the Gas Light and Coke Company. The muster would have been considered a very good one indeed under the best conditions, but it was extraordinarily so under weather conditions which were, to say the least, peculiarly depressing—even for November. There are no results without causes; and the Association owe a debt of gratitude to the President, Mr. S. B. Chandler—whose activity on its behalf was evidenced by a letter from him on Junior Association work which recently appeared in our pages.

This was the second visit of the Association to these works; the first having taken place in January, 1913, when, according to the account of the proceedings which appeared in the "Journal" at the time, "in spite of a heavy downpour of rain, which continued throughout the afternoon, there was a good gathering of members." When the time comes for the third visit, let us hope the weather will be such as to enable the works to be seen at their best. "Views" on Saturday were out of the question; but, on referring back, members will find in their "Transactions" for 1913 three first-rate photographs of the works which originally appeared in the "Co-Partners' Magazine of the Gas Light and Coke Company." Quite a lot of those present on Saturday took part in the former visit; and proof of the interest that is shown in inspections was furnished by the way in which these members were able to recall special features of the works.

Unfortunately, the Engineer of the works (Mr. J. H. Methven) was away on business in the North of England; but the visitors were heartily welcomed by Mr. W. Grogono (his Chief Assistant), and found excellent guides in him and Mr. L. Lacey, and Mr. W. Barclay. Immediately on entering the gates, there is encountered one of the principal features of the station, which is one of the

largest belonging to the Gas Light and Coke Company. This is the handsome two-span iron bridge over Bow Creek, by which the site is approached. The works themselves are practically half-a-century old, having been commenced by the Imperial Gas Company in 1870, and first used by them for the making of gas in 1873. The design of the works and the details of construction (with the single exception of the bridge just mentioned) were carried out by the late Mr. T. N. Kirkham, who was at that time Chief Engineer to the Imperial Company. There is ample space available for any extensions that may be required; and some work of this character is, as a matter of fact, now in progress, in the shape of two new 4 million c.ft. per day sections.

As originally built, the works contained four massively built stage retort-houses of a nominal aggregate productive capacity of 10 million c.ft. per day. The houses are built in a line of two double-span buildings, parallel lengthwise to the dock lying on the western side. This dock is another of the striking features of the works; the dimensions being 1000 ft. by 100 ft. At the edge of the dock, at two places opposite the middle of each pair of retort-houses, are coal-lifts each containing a pair of Hone grabs for discharging the coal barges that come up the river. These grabs place the coal into travelling hoppers, which, in their turn, deliver it into trucks on an elevated railway This is continued into, and through, the retort-houses, and from it either the retort-house coal-stores are fed, or the coal tipped into outside stores on the far side of each retort-house. Each house contains 26 settings of ten retorts. At present only two of the houses—Nos. 2 and 3—are working; and members were lucky enough to see Nos. 1 and 4 in process of being remodelled. Full charges are worked; and a point emphasized by Mr. Grogono was the immunity from naphthalene troubles which the station enjoys. It may be remarked that the hydraulic mains are fitted with anti-dip valves. The stoking machinery in the four houses, when reconstruction is complete, will consist of Arrol-Foulis chargers and Hunter-Barnett coke-pushers—all operated by hydraulic pressure. The works will then have a capacity of 16 million c.ft. of coal gas per day. Added to this, are four sets of Humphreys and Glasgow carburetted water-gas plant, each capable of making 1 million c.ft. of gas per day; so that when the scheme in hand is finished, the works will be able to turn out a total of 20 million c.ft. of gas per day.

Sufficient space was left between the retort-houses to provide room for the substantially built exhauster-house, pump-room, and fitters' shop common to the whole works. The practice adopted at these works is that of exhausting the gas before it is condensed; the exhausting being done at from 145° to 150° Fahr. There are two installations of exhausters—one for dealing with the gas made in the four retort-houses on the works, and the other for pumping Beckton as well as the Bromley gas into the 48-in. Beckton main passing through the works. It was mentioned that the velocity of the gas in this main is about 45 ft. per second; and that the pressure drops approximately 5 in. a mile from Beckton.

Attention was drawn to other portions of the plant, either in use or in course of construction—including the Livesey washers, the cyanogen washers, the vertical Kirkham, Hulett, and Chandler washers, and atmospheric condensers. Inspection was also made of the toluol plant, which performed such good service during the war, and of an installation now being erected of ferro-concrete overhead purifiers. There are two sets of these concrete purifiers, each set consisting of six vessels, each vessel being 40 ft. square. By the valve-room has been placed a rotary meter, of a capacity of 6 million c.ft. of gas per day, guaranteed down to 25,000 c.ft. per hour. The connections to this are so arranged that, when desired for testing or other purposes it can be run in tandem with one of the station-meters. There are two streams of gas from the exhausters to the condensers, at the inlet of which they are split into four streams, and so pass to the inlet of the scrubbers. At the outlet, they come into a common main. A complete examination of all there was to see would have occupied far more than the two hours at disposal.

After tea in the building set aside on the works for the use of the Rifle Club, Mr. Chandler remarked that the Association had received a good many favours at the hands of the Gas Light and Coke Company; and among them the visit of that afternoon would stand out prominent. The works possessed many features of considerable interest. A vote of thanks was passed to the Company and to the members of the staff who had accompanied them round the works, on the proposition of the Senior Vice-President (Mr. F. J. Pearce), seconded by Mr. Bell, of Reading, who voiced the opinion of the visitors that the works are in a high state of efficiency. Mr. Grogono undertook that the vote should reach the proper quarter.

Rear-Admiral (Retired) Philip Dumas, C.B., is next Tuesday to read a paper, on the "Conservation of Oil," before the Institution of Petroleum Technologists, at the Royal Society of Arts. The time of the meeting is 5.30.

No. 69 of "A Thousand-and-One Uses for Gas," which is just to hand, and the following issue (No. 70), are based upon a paper which Mr. H. H. Creasey, Consulting Expert to the British Commercial Gas Association, read at the recent conference. An abstract of this paper will be found on another page of this number of the "JOURNAL;" the subject dealt with being "Government Housing Schemes and the Gas Industry."

MIDLAND JUNIOR GAS ASSOCIATION.

A meeting was held at the Reading Room of the Council House, Birmingham, on Thursday evening last—Mr. C. CARRINGTON BARBER (the President) presiding over a large and representative attendance.

Mr. R. A. S. BROWNING, Works Engineer of the Nechells Gas-Works, read the following paper:

SOME GAS-WORKS PROBLEMS AND THEIR SOLUTION.

The main object of these Junior Association meetings is, I believe, educational; and I thought that a few notes on some of the difficulties which occasionally occur on a gas-works, and the methods adopted to deal with them, might be of use to some of you. With this in view, I have made a few notes of some problems with which I have been faced, and the means which have been taken to solve them. I do not claim the authorship of all the solutions; and I should not like to dignify this contribution to the proceedings by the name of a paper, but rather an informal chat among ourselves about our daily work.

With regard to the reading of papers, it has often struck me that too much is made of the smooth working of the particular plant or machinery of which the paper is the subject, and of the wonderful results obtained. During my sixteen years of gas-works engineering, it has not been my luck to come across any part of the plant which may be described as anything like perfection. Yet when one thinks of some of the papers one has heard read, the conclusion one naturally draws is that at last we have found something which need never cause us to have any more sleepless nights. Now we know that this is not correct. We are generally held responsible for the working of the various plants, and are fully aware of their little failings.

I consider that in all descriptions of carbonizing plant or special types of machinery, &c., mention should be made of their good points and also of their failings. It would help us so much in deciding which particular plant would be more suitable for our own special conditions, and also how to proceed when putting the plant into operation. This subject has been raised before by Mr. D. C. Cross, of the Southern District Association, and drew forth a letter to the "GAS JOURNAL" from Mr. John West, in defence of his particular system of vertical retorts, in which he claimed perfect flexibility and smooth working. Towards the end of the letter, however, he admits to some slight defects in certain of the plants erected, and the means taken to put things right. This is just the sort of information we want.

To come to the subject of this paper, I daresay you have found that when retort-settings have for some reason or other been worked beyond their normal life, it very often happens that uneven heating occurs. If the producer nostrils and secondary air ports are clean, and adjustment of the dampers will not put things right, the trouble will most probably be found to be a blockage of the flues round the top retorts. These flues are difficult to get at when the retorts are at work; and I have found that the steam generated by a bucketful of water thrown into the producer through the top firehole will very often clear the obstruction. This should only be tried as a last resource, and only on those beds which are shortly due for resetting. The method of procedure is to close the primary and secondary air slides, balance the top firehole door so that it can be closed quickly, throw a bucketful of water well into the furnace, and close the door as tight and as quickly as possible. I have also experienced in very old settings a difficulty in drawing in a sufficient supply of secondary air to promote perfect combustion—due to the leaky condition of the waste-gas flues. Failing to make these flues tight, close-up the secondary air supply altogether, and admit the required quantity underneath the bottom retort. This will enable you to carry on at the expense of a slightly increased quantity of fuel used.

It sometimes happens that certain ascension pipes give more trouble than others. This may be due to either a short dip, leaky retort, light charges, or excessive heats. In the case of a short dip, and where the flange of the dip is already iron and iron with the top of the hydraulic main, I have found that a cylinder of tin, shaped to the inside of the dip pipe, lowered to the required depth and supported by strips bent over the top of the arch pipe and secured by the cap, will quite answer the purpose. I have also found great relief by fixing at the top of the ascension pipe a piece of ¼-in. pipe bent to form a seal and fitted with a tundish, into which a supply of water is allowed to drip, or even a tin of water placed inside the mouthpiece under the outlet to the ascension pipe, and refilled every time the retort is charged, will keep the pipe wonderfully moist.

When on an extended run of very dirty coal, which has been frequent during the last two or three years, we experienced great difficulty in getting enough primary air through some of our vertical retort producers. Fires which were thoroughly cleaned out on the morning shift were found to be almost blocked-up by the night shift. A small steam supply fixed in the primary air flue in the form of an injector was found to help matters very considerably.

Some time ago, owing to the large amount of unscreened coal being received, we experienced great difficulty in getting the coal to run in the inclined retorts. The low weight of the charges, besides seriously reducing the output from the house at a very

critical time, also caused troubles in the hydraulic main, ascension pipes, &c., and an alarming increase in the amount of naphthalene in the gas. No alteration in the elevation of the charging shoots seemed to make any difference; and, owing to insufficient head room, it was quite impossible to give the coal a longer drop. Finally we decided to alter the design of the shoot itself, which was originally built with the bottom at the same angle as the retort. The nose end was bent slightly upwards towards the crown of the retort, which had the effect of discharging the coal so that it struck the bottom of the retort about a quarter of its length down. An increase of some 30 p.ct. in the weight of the charge was effected, which soon cured all the above troubles, made the work generally easier all round, and considerably affected the cost per ton of coal carbonized. There is one slight drawback, however; and that is with the very rough coal it is rather difficult to prevent the larger pieces from bouncing over the coal stop at the discharging end. But I consider of the two evils, the latter is by far the less.

In 1916, we had installed a 4¼ million c.ft. per day horizontal retort plant. Shortly after the retorts were put to work, it was found that there was rather a large difference in temperature between the top and bottom retorts. The retorts are set in vertical twos, in beds of eights, and the products of combustion are drawn from the combustion chamber vertically between the two rows of retorts, over the tops, down between the retorts and the side walls of the beds, and under the bottom retorts, to the waste-gas flue. Some considerable time was spent in experimenting with the primary and secondary air supplies and the small bed dampers in the endeavour to bring the point of combustion nearer to the bottom retorts. But no appreciable effect was obtained in any increase of temperature. The runners and second-tops are protected on the chamber side by shield tiles; but it was not considered that the tops would need it. However, in a very short time, the majority of the top retorts developed some bad leaks, and also began to lose their shape.

As soon as possible the beds were let-down for patching; and it was then decided to shield the top retorts in the same way as the runners and second-tops, and the waste-gas flue underneath the bottoms was made shallower by a course of bricks, thereby bringing the heat more into contact with the bottom of the retort. On restarting the beds, these alterations were found to be perfectly justified. We are now able to work with a pressure on the furnace. The chamber temperatures are, on an average, 150° Fahr. lower; and the difference in temperature between the bottom and top retorts is not more than about 50°.

When the horizontal plant had been running a few months, the motors driving the long coal-conveyors over the coal-hoppers commenced to give trouble. They were coupled-up direct to the usual pinion-and-gear wheels at the driving end, which tended to set up an excessive amount of vibration. This was considerably eased by moving the motors further along and substituting a belt drive.

About twelve months after the coaling plant had been started, the sliding doors in the conveyors regulating the supply of coal to the hoppers commenced to come out of place, with the result that the coal got underneath them and caused them to buckle-up. This was overcome by riveting a narrow strip of flat iron underneath the end of the slide, and projecting over the opening in the conveyor pan. The slides can now be worked in any position, and have needed no attention for some considerable time. The conveyor is of the De Brouwer type, only narrower and with slightly deeper cross-bars.

We also had trouble with the coke-conveyors on the new plant continually coming off the sprocket wheels, and causing various breakages to the gear wheels, plummer blocks, &c. The conveyor is one of the usual De Brouwer type, and travels along the front of the beds, collects the coke, takes it up an incline, and drops it into a receiving hopper. The conveyor then returns over a couple of turnover wheels, and at the bottom of the incline it engages with the driving sprocket wheels, to which is attached the usual tension arrangement. The whole was driven at this point by a motor coupled direct to the necessary reducing gear. The motor we treated in the same way as the coal-conveyors, on account of excessive vibration. The trouble with the conveyor mounting the sprockets was finally cured by fitting an extra pair of jockey wheels fixed so that a greater number of links engaged with the teeth at the same time. We are not at all satisfied with the present drive; and, when convenient, we intend modifying it by placing it on the top of the incline—leaving the tension weights as at present.

We recently installed a turbine-driven exhauster. On putting to work the steam-governor which came with it, although following very carefully the directions enclosed, we could not get anything like a good line on the inlet to the exhauster. Eventually I decided to depart from the instructions, and had the governor tank filled up with water. This brought it into action, and it answered splendidly to any variations.

In connection with this I noticed the other day that the vacuum chart was not so good as usual. On inquiring from the driver the cause, he said he could not account for it, as all the syphons in connection with the vacuum service were clear, and the steam pressure steady. Returning to the exhauster house some little time afterwards, the line was all right again. On asking the driver what he had found out, he said "he had put a drop of water in the governor."

In 1915, when the Government called for an increased production of benzol and toluol, it was decided to instal an oil-washing plant on the outlet of the purifiers. The maximum pressure at the inlet of the purifiers previous to this installation used to run up to about 25 in., and the lutes of the boxes blew at 27 in. It will be seen that putting an extra plant on the outlet, throwing anything between 5 in. to 8 in. of back pressure, would cause us endless trouble in the purifier-shed during the heavy winter makes. Extra boxes were out of the question, on account of time; luteless purifiers, for the same reason; and it was not practicable to deepen the lutes of the existing boxes. The trouble was got over by placing at the inlet of the meters a turbine-driven fan. This was governed to reduce the pressure at the inlet of the meters to 1½ in., which, together with the pressure thrown by a Solvene washer and the toluol plant, was all that was obtained at the outlet of the purifiers. The plant runs admirably, and gives us much more ease in working the boxes, as the margin of back-pressure thrown by them now is the difference between 8 in. or 9 in. on the outlet and 27 in. on the inlet.

Last winter we experienced such a severe leakage of water in the third lute of one of our gasholders that it practically put the bottom lift out of action. On examination by listening on the side sheets, we located some of the worst places. The problem was to ascertain what was causing the trouble, and the best means of overcoming it without putting the holder out of commission. The leaky lute was cupped-up to a convenient working height, and clay well rammed in each side of the suspected leak. The space between the clay was then pumped clear of water, and it was found that the rivets in one of the seams had worked slack, causing the seam to open as soon as the weight of the lift came on. The seam was then opened as much as possible, which tightened the rivets up again, and then was well caulked. In one or two cases, individual rivets were so loose that we decided to cut them out altogether, and the hole was tapped and screwed and a set-screw inserted.

It sometimes happens that holes in the side sheets of gasholders become too large for the usual swivel-headed bolt and small patch. To make-good while the holder is still at work, I have found the following method very successful: Uncup the lift which requires patching. Lower a ¾ in. bolt threaded through a square patch larger than the hole by means of a long piece of string, taking care that the whole is on the outside of the grip of the cupping lift. Cup the lift, and raise it until the hole to be patched is above the level of the water in the tank. Insert a piece of wire bent to form a hook, and secure the string which ought to be suspended inside the lift and opposite the hole. Draw the bolt through, thread on another patch, and screw-up. The string is fastened on to the bolt much in the same way as when putting a baghole cover on a cast-iron pipe.

I daresay you will think a good many of these solutions were very crude; but they answered their purpose at the time, and enabled us to carry on until we could deal with them more adequately. The incidents nearly all occurred during the war; and as you know, material was very difficult to obtain and the output of gas was so great during the six months of the year that it was necessary to work every available part of the plant.

In conclusion, I may say that my object in contributing these few notes is the hope that it will loosen some of the members tongues as to little difficulties they may have been up-against, and the means taken to overcome them. It might be said that discussions of this sort would tend to destroy initiative, and that each engineer ought to work out his own salvation. I do not think that this attitude is the best for the industry, especially in these times of reconstruction and of competition. We have a monopoly in our own particular district; and it is of no personal advantage to any engineer, or to the company or corporation he serves, to withhold anything which would be of use to the industry in general.

Discussion.

The PRESIDENT, in moving a vote of thanks to Mr. Browning for his valuable contribution, expressed a hope that members would bring forward any matters in gas-works administration and practice coming to their notice. Much could frequently be learnt from what might be regarded as the commonplace.

Mr. C. F. W. RENDLE (Redditch) seconded the resolution. Personally, he said, he had never found the top flues choked. He inquired what were the dimensions of the flues referred to by the author. He had often found that the bottom flues became choked. As to the ascension pipes, he thought all leaky retorts bore considerably more weight than was generally imagined. Regarding the long coal conveyors, he could testify to the advantage of putting on push-plates.

Mr. T. H. POULSON (Stafford) was of opinion that a very real gain would be secured for the members by the introduction of "paperettes." He regarded the reading of these as being a marked advance in the work of the Association. The credit for their introduction was due to Mr. T. F. E. Rhead. He commented on the danger of throwing water into the producer; and in this connection he inquired where the furnace doors were fitted. As to the stoppage of the ascension pipes, he agreed that it was very bad if any of the dip-pipes were unsealed. Where the seals were somewhat regular, the trouble could be overcome by fixing a retort-house governor.

Mr. W. H. REED (Leamington) inquired if it were the steam arising from the buckets of water thrown into the furnace that removed the obstruction.

Mr. J. H. DAVIS (Birmingham) referred to the naphthalene difficulty, and said it was particularly unfortunate that, after so many years of experiments, gas-works engineers had not been able effectively to grapple with the problem. For the sake of the industry he hoped in the near future an improvement in the present position would be effected.

The PRESIDENT pointed out that the naphthalene trouble had been

brought about by conditions due to the war. They had been short of coal, and had been instructed to conserve coal as much as possible. To get from it the fullest return gas undertakings had to supply a relatively low quality of gas. At the present time, steps were being taken, by adding oil to the gas, to carry forward the naphthalene—thus supplementing the work of the oil-washing plant.

Mr. J. H. DARRAH (Birmingham) asked where the obstruction went to, in the instance mentioned as to removal of blockage in the flues round the top retorts by throwing water in the producer. Regarding the use of steam below producer grates, he thought the improvement was due to two causes—the softening of the clinker, and the introduction, by means of the steaming, of more primary air. The arrangement of horizontal retorts in two vertical rows was generally supposed to be good practice; and he thought the original design of the setting must have been faulty to necessitate the alteration mentioned to the flues below the bottom retorts.

Mr. T. F. E. RHEAD said that the back-pressure thrown by the two toluol washers, working in parallel, was about 2 in. water-gauge—their capacity being 5 million c.ft. each. In regard to naphthalene troubles, he pointed out that even 2 to 3 grains per 100 c.ft. of gas was likely to cause some trouble. They had little ground for the statement that oils put into the gas helped to "carry" the naphthalene. What happened was that when the gas was cooled and the oils came down, they scrubbed the gas and washed-out the naphthalene. Otherwise, if no oils were present in the gas, the naphthalene was deposited alone, in the solid state, and caused trouble.

Mr. J. K. WESTWORTH (Birmingham) said he had found some benefit from steam being admitted to the producer of horizontal retorts; the clinkering periods being considerably lengthened.

Mr. H. W. DEAN (Birmingham) thought that the step-grate had done much to decrease producer troubles, and that the practice of working without clinkering doors was much the best.

Mr. V. E. GREEN (Birmingham) agreed that much good would follow if engineers more fully discussed their failures. It did not pay to keep knowledge back, whether of success or failure. The value of the paper would have been enhanced by the use of sketches—even on the blackboard.

Mr. M. POULSON (Stafford) referred to the working of the continuous verticals at Stafford. Since early June, when the plant was started-up, they had had very little trouble, except the breaking of the worm wheels in the coke-extractors. This had been overcome by further slight weakening of the safety bolts. As to results from steaming, they were getting nearly 50 p ct. better makes than was guaranteed. The steam pressure was 35 lbs., through ¼ in. nozzles; and their make per ton was about 19,500 c.ft. of 470 B.Th.U. gross.

Mr. A. ST. D. CORDER (Birmingham) spoke of troubles he had experienced with the use of Somersetshire coal in continuous verticals. Much sticking of the charge occurred; and Midland coal had to be mixed with the former to get proper travel.

The vote of thanks was unanimously passed.

Mr. BROWNING, in acknowledgment, pointed out that the flues in the top of the settings, which had become choked, were about 9 in. by 4 in. The flue below the bottom retort was 12 in deep; and this was reduced by 3 in. by a course of bricks put in specially on the flue bottom. The extra shield tiles he mentioned were not needed finally, as their combustion chamber temperatures had been reduced as stated. He also elaborated several points which had been raised in connection with coke-conveyors. The practice of throwing water into the producer to remove flue obstructions was a last resort, to be made use of only on old settings. The dust was carried down into the waste-gas flues, where it could easily be raked-out. The benefit derived from producer steaming was due chiefly, he thought, to the tendency to ease matters as regarded clinkering, and allow of more primary air passing through. He further described the process of repairing gasholder side sheets, in reply to several requests for further information on this matter. As regarded step-grates, he had not had very much experience. In his opinion, the greater percentage of producer troubles generally were due to insufficient grate-area; and if this was the case, then step-grates would not cure the trouble.

Cement Joints.

In the paper he presented at the recent annual convention of the Pacific Coast Gas Association, Mr. W. M. Henderson pointed out that the first essential feature of a good joint is that it be tight and free from leakage; and next that it be inexpensive and easy to make-up. To his mind, cement meets these requirements. Neat cement, however, will not give the satisfaction obtained from a mixture of portland cement and sand. Neat portland cement, in setting, rises in temperature over a range of 60° to 150° Fahr. in twelve hours; while a mixture of one part of portland cement and one part of sand only rises in temperature during setting from 60° to possibly 70° Fahr. in twelve hours. This is ample reason for selecting a mixture; for it is natural to expect considerable expansion to accompany the increase in temperature during setting of the neat cement, which will likewise be followed by contraction. Neat cement has a greater tensile strength than cement mixed with sand; but the strength of the latter, when mixed one to one, is strong enough for any joint. Good clean sand, not too fine, and not necessarily sharp, will make a strong mortar. The yarn is an important factor; and the abandoned rigging from sailing-vessels cannot be excelled. The best mixture for the joint is three parts cement to one part sand, and just sufficient water to make a dough that will hold its shape. The quantity of cement, sand, and water should be mixed as necessary for each joint as it is made. Joints are best made in the afternoon, permitted to set through the night, and tested the first thing next morning. Joints left exposed during the day must be shielded from the sun's rays. With the constant rise in costs of material, cement has done its bit to keep-down the cost of new extensions.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

Visit to the Newbattle Collieries.

The members of the Scottish Junior Gas Association (Eastern District), through the kind permission of the Lothian Coal Company, Ltd., paid a visit last Saturday to the Newbattle Collieries, Newtongrange. A fair number of members, were present, and an enjoyable afternoon was spent.

Mr. Mackay, the General Manager, and Mr. James Murray, the Secretary of the Lothian Coal Company, Ltd., met the members and conducted them over the workings.

The history of mining in Newbattle dates back to the Twelfth Century; remains being found in the vicinity which indicate that the coal had been obtained by a system of quarrying. The Lothian Coal Company was formed in 1890. The area of the coalfields held by the Company at the present time equals nearly 13,000 acres; and the Newbattle Collieries comprise the Lady Victoria and Lingerwood pits, and the Easthouses incline. The chief of the pits is the Lady Victoria, through which the members were shown. The pit and pithead are noteworthy in many respects. The former descends to a depth of 1650 ft., and is one of the deepest in Scotland. It is furnished with many special appliances for labour-saving and expediting work. At the pithead the members were specially interested in the washing and screening machinery, which was clearly explained by Mr. Mackay.

The area covered by the works, binging ground, and railway sidings is about 32 acres. The whole surface works are lighted by incandescent gas-lamps, the gas being made at the Company's own works in Newtongrange, from which it is also supplied to the neighbouring villages. The members availed themselves of the opportunity to descend the shaft, and an interesting hour was was spent in examining a few of the workings and machinery underground.

The Company very kindly entertained the members to tea; and and Mr. Farquhar, the President of the Association, expressed the thanks of the members to Mr. Mackay and Mr. Murray for their trouble in receiving the visitors and in the explanations given. Mr. Murray briefly replied.

COKE-OVEN MANAGERS' ASSOCIATION.

Annual Dinner.

Following the annual general meeting of the Coke Oven Managers' Association at Sheffield, on Saturday, the 25th ult., at which the newly-elected President (Mr. J. W. Lee, F.I.C., F.C.S., of the Hasland Coking Company) delivered his address [*ante*, p. 186] the fifth annual dinner took place at the Royal Victoria Hotel. The President occupied the chair; and there was a very large gathering. The chief guest was Mr. D. T. Gray, D.Sc., Ph.D., F.I.C., the Superintendent of Laboratories, National Fuel Station, East Greenwich; and others were the Lord Mayor of Sheffield (Alderman Wm. Irons, J.P.), Colonel A. St. John Cooke, D.S.O., of the War Department, Lieut.-Col. S. Rhodes, D.S.O., Mr. Cosmo Johns, and Sir Henry Hadow, Mus.Doc., M.A., F.R.S.L., Vice-Chancellor of Sheffield University. After the Loyal Toast had been honoured,

Mr. B. WILSON HAIGH (Hon. Treasurer) proposed "H.M. Forces," and Colonel A. ST. JOHN COOKE, D.S.O., who responded, said that he hoped some legislation might presently be brought about which would make it an offence to strike until such time as both sides of the case had been made public—possibly in the Press—for a period of (say) ten, twelve, or fourteen days. If this took place, he felt sure a large number of possible strikes would not take place, because it would quickly be clear that public opinion would not be behind them. After all, these strikes were usually based on misunderstandings. The forces, it must be recognized, were not quite so much asleep when the war broke out as some people seemed to think. On July 25, 1914, one of the big coke-oven installations was called upon to supply a large quantity of benzol for the navy; and the drums and containers got back for the second load before Aug. 5. The results of co-operation in the coke-oven industry, and the working of the Fuel Research Committee, would be of infinite benefit, and there would be great development therefrom.

Lieut.-Col. S. RHODES, D.S.O., who also responded, said the thing about the coke-oven industry that struck him most during the war was the immense variety and value of products turned out; but it struck the Germans a good deal more.

Mr. WILLIAM DIAMOND (Marley Hill, Northern Section) proposed the toast of "The City and Trade of Sheffield."

The LORD MAYOR responded. He said coke and its associated bye-products were playing a rapidly-growing part in the progress of many industries. During the war, towns had suffered in the quality of gas, consequent on the extraction of the toluol and benzol. The ordinary citizens knew little about these substances; but they knew good gas from poor gas, and were trusting that the two ingredients would soon be retained, and that they would have better gas.

Dr. GRAY, proposing the toast of "The Coke-Oven Managers' Association," said the industry carried on its shoulders a very great responsibility. It handled nearly 10 p.ct. of the total coal output of the

country, and turned out (apart from bye-products) one of the principal products of the metallurgical industry—coke. It was very difficult to realize, in regarding the extent of the industry now, that only thirty or forty years ago coke was made mostly in the very primitive method handed down by our ancestors—the beehive oven. It was still more surprising to many of them to know that coke was yet being made by this means in some cases. It was true that during the war an enormous development had taken place; but it was scarcely short of a scandal that this wasteful method should have survived so long, especially when there was such a need for the conservation of fuel. One found it difficult to understand why the development of the industry should be thus slow. It was gratifying to know that the development, when once started in Great Britain, had spread very quickly, and now the great bulk of the coke was made by modern scientific methods. Unless they were prepared to insist always that the men engaged were of the highest possible scientific and technical training, they could never hope to make headway; and the industry which failed to make its contribution to the general progress must quickly fall behind. The authorities must be pressed always to provide such men, and men whose duty would be to carry on independent experimental work. Dr. Gray said he believed one of the objects of the Coke-Oven Managers' Association, and an object in having asked him to attend that evening's function, was to indicate the intention of the men now in the industry to carry on research work such as was being done by the Department with which he was connected. He could assure the industry that this Department would heartily welcome co-operation in the solution of the important problems which confronted the industry. The Department had plans on foot for undertaking experiments on high-temperature coking. They were to experiment on the effect of gradually increasing temperatures, and were to investigate a matter which, no doubt, was agitating the minds of most of those present at the dinner that evening—namely, the development of the construction of the coke-oven itself. He felt that much attention had, perhaps, been paid lately to the question of ammonia recovery. The whole tendency had been rather to sacrifice everything in order to get a high yield of ammonia. He held the opinion that, on account of the very large production of sulphate of ammonia, the position of the ammonia markets would not be quite so favourable for some few years in the future as it had been. They would have to think in terms of £8 to £10 per ton, instead of £12 to £15 per ton, and decide whether it would continue to be desirable to sacrifice the yield of improved coke for the sake of a little more ammonium sulphate. It seemed to him quite evident that advantage might be gained by decreasing the width of the oven considerably. Experiments had been going on in America, where an oven very much longer and higher and narrower had been developed, and where the coking charge was complete in something like 16 hours as against 24, 26, or up to 40 hours. The result of working in this way had been to increase the output of the oven. In the meantime, this was not the standpoint from which he was looking at the matter. He was more concerned with the effect on the character of the coke. From experiments which he had made, he was satisfied that if they followed the American practice, decreased the width of the oven, substituted for the ordinary fire-clay brick a silica brick with higher conductivity, and arranged more heat at the side flues, so as to take the heat more quickly into the coal, it would be possible to produce quite as serviceable a coke from material which would be perfectly worthless in the ordinary oven. This was only one of the many problems which confronted the industry.

The PRESIDENT, in response, assured Dr. Gray that his Department would find in the Coke-Oven Managers' Association a company of men who were always ready to put at the disposal of the Department all the information they could, and all the opportunities they might have for gaining further information on the plants, so that they might make it possible for the coal supplies of the country to be used in a nationally beneficial way. He thought the coking industry would ultimately have to combine its activities largely with those of all other carbonizing industries—whether high temperature or low—and also join hands with other industries employing coal, in order to see that this national asset should be used in the most economical way.

Mr. D. V. HOLLINGWORTH, F.I.C., F.C.S. (Birchenwood, Western Section, and late President of the Association), proposed "Kindred Societies," and suggested that the steel industry would have to exercise economy if it was going to compete with the great combinations across the seas. He was not suggesting that the iron and steel industry could make greater use of spare coke-oven gas for many purposes than it did at present. He was delighted to find that Dr. Gray was an advocate of the discontinuance of the use of the beehive system. It was high time this system was scrapped.

Mr. COSMO JOHNS, in reply, said he was struck by the broad-mindedness of the Coke-Oven Managers' Association in recognizing kinship with societies of other industries.

Mr. GEORGE CHRISP (Silverwood, Northern Section), proposed the "The University," and spoke of the great debt which the coking and other industries owed the Universities, and more particularly, so far as their industry was concerned, to the University of Sheffield, which had always taken a kindly interest in the coke oven industry, and had given much valuable advice and help.

Sir HENRY HADOW (the Vice-Chancellor of Sheffield University) responded, and said the Universities would co-operate with such Associations to the utmost of their ability in helping to solve technical problems. This was part of their work.

Dr. WILLIAM RIPPER (Head of the Applied Science Department of the University) also responded.

Proposed Sheffield Gas Purchase Bill.—The Sheffield City Council were to receive at their meeting yesterday [Monday] a report by the Committee who have been in negotiation with the Gas Company. It was proposed to ask the Council to consider the question in Committee; and a recommendation was to be submitted that the Town Clerk be instructed to take the necessary preliminary steps to give notice of the Council's intention to promote a Bill in the next session of Parliament to enable the Corporation "to acquire and manage the undertaking of the Sheffield Gas Company."

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Retort-Charging.

SIR,—With reference to Mr. Chas. E. Wright's letter published in your last issue,

Mr. Wright may be interested to know that a similar method of charging was also suggested by the late Mr. E. S. Cathels in the early '80's of the last century, and was tried unsuccessfully in what was then the "new" retort-house at the Windsor Street Gas-Works, Birmingham.

17, *Victoria Street, S.W., Nov.* 8, 1919. CHAS. HUNT.

Coal Conservation.

SIR,—It is seriously suggested that many gas undertakings in the country would be interested to know how it is that the South Metropolitan Gas Company have been able to obtain supplies of coal in sufficient quantity to enable them to supply gas of 500 B.Th.U.'s in these times.*

Many important undertakings are not able to procure full supplies. The undertaking with which I am associated received last year only 85 p.ct. of the pre-war requirements; and the coal supplied was particularly high in inerts. The position during the current year has not improved; and our consumers—industrial, domestic, and general—taking special notice of the widely circulated tests of gas supplied in South London, complain that they are not being fairly treated.

Is it not the duty of every public utility undertaking to accept loyally its fair share of responsibility in this matter? If every gas authority were to insist upon supplies of coal sufficient for the maintenance of the standard adhered to by the South Metropolitan Gas Company, obviously there would not be sufficient coal for the South Metropolitan Company.

The policy of this Company would not concern others in normal times; but in a time of great scarcity like the present, the policy pursued by this large and influential Company, of using more than their fair share of coal, is not neighbourly.

Nov. 8, 1919. YORKS.

* The average given in the report published on p. 194 of our issue for Oct. 28 was 558·7 B.Th.U.—ED. G.J.

Radiation versus Convection.

SIR,—Until we had perused the "JOURNAL" for the 28th ult., we were happy in the opinion that this controversy had died a natural death some ten years ago; and we are somewhat astonished at its resurrection. Like Mark Twain, we would prefer a "fresher corpse."

One query we would most respectfully put to you. Who is the superman who decides that 50 p.ct. of radiant heat from a gas-fire is as much as is good for poor mortals? For our part, we are still endeavouring to offer them more. We do not favour "hot air."

Leeds, Nov. 5, 1919. FOR WILSONS & MATHIESONS, LTD., HAMILTON DAVIES.

Step-Grates.

SIR,—The step-grate was patented by Mr. Brown, when he was at Ilford, about twenty years ago, and has been used by myself for the past fifteen years.

39, *Victoria Street, S.W., Nov.* 5, 1919. C. B. TULLY.

The Manchester Institution Discussion.—The speaker whose remarks were reported last week, in the discussion on Messrs. Buckley and Sinnatt's paper before the Manchester Institution meeting the previous Friday, was Mr. F. W. J. Belton, of Macclesfield—not Mr. C. M. D. Belton, of Shrewsbury.

Gas-Works Purchase Discussed at Redcar.—The question of the purchase of the works of the Redcar Gas Company by the Local Authority has been discussed at a meeting of ratepayers. Major Crone (the Chairman of the Council) said it was certain that within a year or two a local firm would be in a position to supply them with coke-oven gas on the same basis as had proved such a benefit to the neighbouring town of Middlesbrough. The price at which it was proposed to purchase the gas-works was £115,000, with an additional £3000 for the Directors and officials. He thought it very reasonable; and, even without the coke-oven gas, it would be a paying concern to the town. If a valuation were made on capacity of output or on the earning power of the works, it would be found that the Council had secured a good bargain. The fact that in recent years extensions and developments had been made largely out of profits, gave an indication of the strength of the concern. Electric lighting had much to recommend it; but the cost would be too heavy to make it to the ratepayers' interest to embark upon an undertaking of this kind. Mr. R. Thomlinson, while not quarrelling with the purchase price, took exception to the payment of £3000 as compensation to Directors who were, he contended, already amply rewarded for their services. Major Crone replied that he would gladly have dispensed with the payment, but could not. It was small compared with what had been paid in other similar instances; and he thought the town would concede it rather than lose the opportunity of purchasing at a reasonable price. At a meeting of the Redcar Council last Thursday, Mr. T. Phillipson again criticized the Council's proposals. They had, he said, committed themselves to unwarranted expenditure. Assuming that the Council would manage the works as well as the present Directors, which he much doubted, he calculated that there would be a large deficiency for a number of years—amounting to about £6000 a year—to be met out of rates. Again, they had no guarantee that they would be able to get a supply of coke-oven gas.

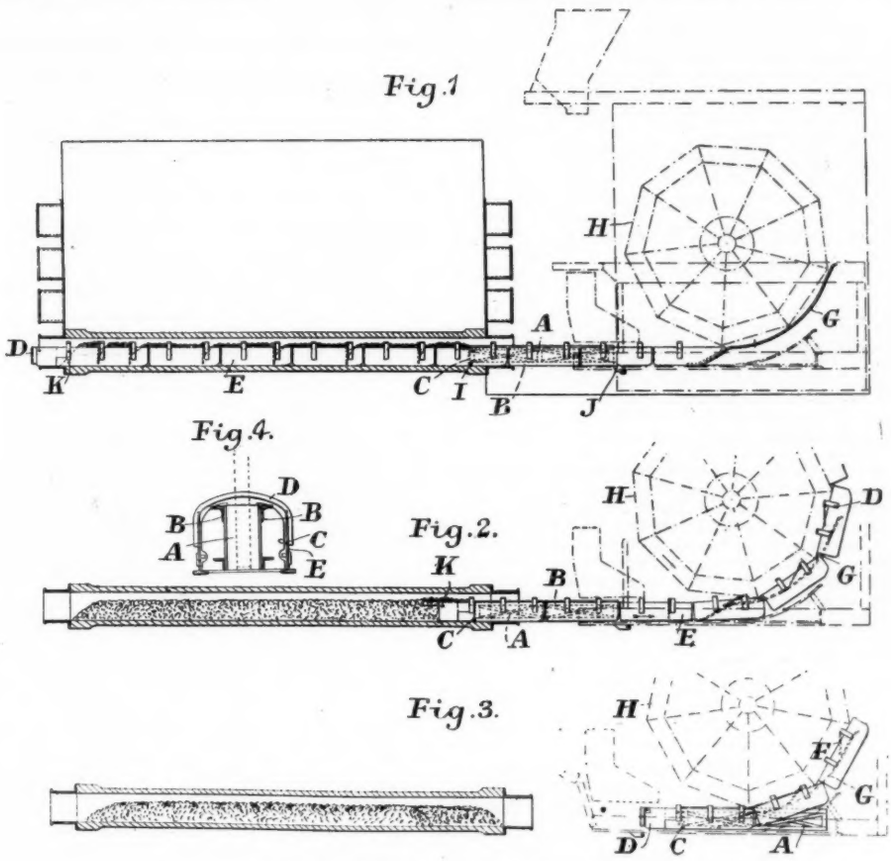
REGISTER OF PATENTS.

Stoking Machines for Gas-Retorts.—No. 133,380.

ALDRIDGE, J. G. W., of Victoria Street, Westminster, and ASHLEY, T. J., of Bath.

No. 12,977; Aug. 9, 1918.

According to this invention, a ram, so constructed that the push-plates slide over it and are jointed in a similar manner to the charging member, is arranged within the charging member and is kept stationary during the greater part of the charging operation—having only a limited movement imparted to it by the charger near the end of the forward and return strokes of the latter. The ram is actuated by the charging member, near the end of the forward stroke, so as to push the last portion of the charge into the retort, while during the return stroke of the charger the ram is held in its forward position by catches until the charger is almost withdrawn from the retort, when it is released and withdrawn with the charger. While the ram is held by the catches, the ram-head acts as a stop-plate and prevents any withdrawal of the coal at the month; but, on the contrary, holds it back and maintains it at the same depth as the remainder of the charge.



Aldridge & Ashley's Gas-Retort Stoking Machine.

Figs. 1 to 3 illustrate diagrammatically a charger equipped with a ram in accordance with this invention—the charging member and ram being shown in different positions in relation to a retort. Fig. 4 is a transverse section of the ram, drawn to a larger scale.

The ram A comprises two spaced side frames B and a transverse plate or ram-head C fixed at the front end; the whole being supported on the bed of the machine in a similar manner to the charging member D, but fitting between the side plates E. While the charging member is pushing the coal into the retort, the ram is held back by an automatically operated catch actuated (through gear) by a pin on the polygonal wheel H; and the swinging push-plates F of the charging member slide along the top of the ram and drop down over the front into their operative position to carry forward the coal.

Curved metal guide strips G are provided adjacent to the wheel H which actuates the charging member as usual; the strips being located in the path of the push-plates and serving to guide them into such a position that they readily slide over the ram when the charging member is being moved forward by the wheel.

As the charging member approaches the end of the charging stroke, projections I on the side plates engage the ram-head and carry it forward into the retort, where it is held by a catch or stop J carried by a transverse rocking shaft mounted in bearings below the guide bed of the machine and connected by a lever arm and rod with a counter-weighted rocking lever, operated by pins on the wheel H, to raise the catch into the engaging position at the end of the forward stroke of the charger and to lower it to release the ram and allow it to be withdrawn by projections K on the forward end of the charging member as this finally leaves the retort.

In Fig. 1 the charging member D is shown in the position where it has just deposited a charge in the retort; the last portion of the charge being carried in by the head C of the ram. At the point of reversing the motion of the charging member in order to withdraw it from the retort, the catch J is automatically caused to rise and engage with the rear-end of the ram, thus keeping the head in the position shown during the withdrawal of the charger, and consequently preventing any withdrawal of the increased charge of coal from the retort.

Fig. 2 shows the charging member D almost withdrawn from the retort. At this point the catch J is automatically lowered, and at the same time the projections K bring back the ram until both charger member and ram have reached the position shown in fig. 3.

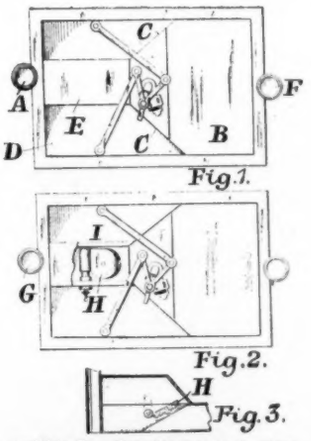
Gas-Meters.—No. 133,522.

SMITH, E. W., of Kennington Park Road, S.E.

No. 19,067; Nov. 20, 1918.

This invention (applicable to both ordinary and automatic or coin-freed meters) has for its main object "to provide a more direct passage for the gas and to better connect the flag to the diaphragm."

The inlet passage to the diaphragm is above the valve plate, and is provided by an extension of the usual valve chamber—the diaphragm being connected to the flag by a double-jointed connecting piece so constructed that one of the joints is limited in its movement (thus buckling is prevented) and the diaphragm has a direct line of to-and-fro movement.



Smith's Dry Gas-Meter Mechanism.

Fig. 1 shows the invention applied to an ordinary meter in which

the mechanism is of usual kind. Fig. 2 shows it applied to the valve of an automatic (coin-freed) meter. Fig. 3 is a detail (elevation in section) of the valve shown in fig. 2.

In fig. 1, the gas-channel from the inlet A to the valve chamber B is a continuation of the ordinary valve chamber tin bridge parts C above the valve plate D. The gas enters at A, passes through the extension E of the valve chamber parts C into B, and from there follows the usual course through the valve and diaphragms to the outlet pipe F.

In fig. 2, the gas enters at G, passes through the meter in substantially the same manner as in fig. 1, but is controlled by the automatic valve H in the extension I, which is the equivalent of E in fig. 1.

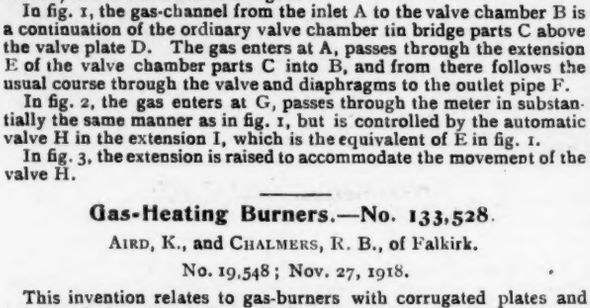
In fig. 3, the extension is raised to accommodate the movement of the valve H.

Gas-Heating Burners.—No. 133,528.

AIRD, K., and CHALMERS, R. B., of Falkirk.

No. 19,548; Nov. 27, 1918.

This invention relates to gas-burners with corrugated plates and interposed plane plates disposed edge-wise to the path of the mixture, and presenting a plurality of fine passages for the mixture. Its primary characteristic resides in the fact that "the corrugated plates and interposed plane plates rest on platforms and are surmounted by a cover whereon are formed the burner nozzles."



Aird and Chalmers' Gas-Heating Burner.

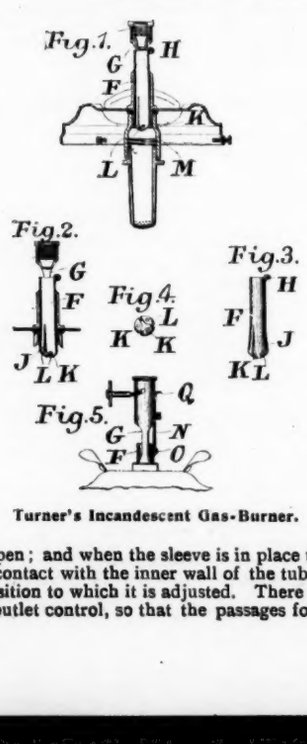
There is fitted to the burner shown, a group of (preferably) metallic grooved or corrugated plates A, resting on platforms B, and retained in position by a removable cover C provided with burner-nozzles. The plates A are separated by plane plates D, and are sustained against endwise movement by distance-pieces resting on the platforms B; the outer lateral surfaces of these pieces being in conformity with the inner contour of the burner, and the inner lateral surfaces being in abutting relationship with the co-terminous plates A and D. The plates are readily removable for cleaning, in the event of the passages being choked.

Incandescent Gas-Burners.—No. 133,515.

TURNER, F., of Bromsgrove.

No. 18,649; Nov. 14, 1918.

In accordance with this invention, the lower end of an axially sliding air-regulating sleeve which slides within the burner tube is divided into fingers bent slightly outwardly, or expanded, so that their



Turner's Incandescent Gas-Burner.

tendency is to open; and when the sleeve is in place they exert a sufficient frictional contact with the inner wall of the tube to maintain the sleeve in any position to which it is adjusted. There is combined with this a mixture outlet control, so that the passages for the gas and air to the burner tip or nozzle may be regulated in order that the velocity of the stream on reduced pressure may not be impaired.

Fig. 1 is a sectional view of the burner; fig. 2 showing the regulating sleeve in a more open position; fig. 3 is an elevation of the sleeve removed from the burner; and fig. 4 is an end view of the sleeve. Fig. 5 is an elevation of the upper part of the burner with a modified arrangement for actuating the sleeve.

The burner shown has any suitable form of gas-nozzle, burner-tube, and burner-tip. The regulator for controlling the flow of gas is arranged in the nozzle, as shown at E in fig. 5. The sliding sleeve F is open at its upper end to receive gas from the nozzle and air from the air openings G in the upper part of the burner-tube. A thumb-piece H is provided, so that the sleeve may be axially adjusted to open or close more or less of the openings G. The sleeve is slit at its lower end into fingers J, which are set outwardly, as shown at fig. 3. The ends of the fingers are inwardly bent, as at K, and perforated as at L, so that the mixture outlet through the slits at the bottom of the sleeve will be regulated as the sleeve is adjusted to regulate the air inlet. The burner-tube has an enlargement at M, so that the end of the sleeve may expand as the sleeve is moved lower down the tube to admit more air at the inlet openings—thus increasing the passage of the gaseous mixture to the burner-tip.

A further means of operating the sleeve is shown in fig. 5, where a link N engages a hook O on the sleeve and works under the head of a set-screw—the link having a thumb-piece for operating it when the screw is slackened.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The opposition to the Ammanford Gas Bill was withdrawn, and the Bill committed.

The Select Committee reported that they had not proceeded with the consideration of the Swinton and Mexborough Gas Board Bill; no parties having appeared in opposition. The Bill was committed.

HOUSE OF COMMONS.

Cost of Seaborne and Railborne Gas Coal.

Lieut.-Colonel HILDER asked the President of the Board of Trade whether, in view of the substitution in certain districts, by order of the Coal Mines Department, of seaborne Durham coal of inferior gas-making properties, instead of railborne Yorkshire coal hitherto used on account of its suitability, and by reason of the extra cost of freightage and additional tonnage required necessitating a considerable increase in the price of gas to consumers, he could see his way, if the arrangement was really necessary in the national interests, to make the extra cost involved a national one, as in the case of the emergency coal supplied for household purposes.

Sir A. GEDDES replied that the reasons for the subsidizing of the small temporary supplies of emergency house coal by sea did not apply in the case of the continuous supplies of seaborne Durham gas coal which it had been necessary to arrange because of the shortage of Yorkshire coal. He regretted that he could not undertake to recommend that the difference between the costs of the railborne and seaborne coal should be met out of public funds.

Mr. BRIDGEMAN, replying to a question by Colonel Newman, addressed to the President of the Board of Trade, said it was true that, owing to the shortage of coal in the Midlands, it has been necessary to require certain consumers in the South of England to take seaborne coal from Northumberland and Durham on which the transport charges were higher than on the railborne coal previously received. But the President of the Board of Trade was unable to agree that the seaborne coals were unsuitable for the purposes for which they were being supplied. It was feared that, as they were now approaching the period of increased consumption with depleted stocks, he could not promise that it would be possible to remove the restrictions at the present moment. The Coal Controller would, however, be pleased to receive a deputation of coal users, and to give them an opportunity of stating their views as to the effect of the restrictions.

Gas Quality in the London Area.

Mr. GILBERT asked the President of the Board of Trade whether his attention had been called to the poor quality gas supplied to consumers by gas companies in the London area; whether he was aware that the average calorific value during September and October this year was: Gas Light and Coke Company, 449·3 B.Th.U.; Commercial Gas Company, 467·2 B.Th.U.; South Metropolitan Gas Company, 558·7 B.Th.U.; whether he was aware that low quality gas added greatly to the cost of living of many families who used it for lighting and cooking purposes; and whether he could compel the gas companies to all supply the same standard and also return to the pre-war standard.

Sir A. GEDDES replied that he was aware that gas undertakings generally were supplying gas of a lower calorific value than that which they sent out before the war. This was being done at the present time with the approval of the Board of Trade, with a view to ensuring an adequate supply to all consumers during the coming winter. As regards the future, he hoped shortly to introduce a Bill giving effect to the recommendations made by the Fuel Research Board in their recent report to the Board of Trade on gas standards whereby gas would be charged for according to the actual number of heat units supplied to the consumer instead of by volume as at present.

Mr. GILBERT asked if anything could be done to compel the London gas companies to supply gas of the same standard, seeing there was

now a great deal of difference between the quality of the gas supplied in the North and South of London.

Sir A. GEDDES promised to have the matter looked into.

Hull Gas-Works Coal Allocation.

Lieut.-Commander KENWORTHY asked the President of the Board of Trade whether he was aware that the heavy increase in the cost of illuminating gas in Hull was largely attributed to the enforced allocation to the gas-works of coal that was totally unsuitable to the gas-making plant; and whether he would consider the question of making some change in the method of allocation and the material allocated.

Mr. BRIDGEMAN, who replied, said he understood that, owing to the shortage of Yorkshire coal, it was necessary to supplement the supply of Yorkshire coal to the Hull Gas-Works with a certain quantity of Durham coal, as had been done in a large number of other cases, but that the regular consignments of Durham coal to the Hull Gas-Works amounted to less than 10 p.ct. of their total supplies. He regretted that it was not possible at the moment to allocate an additional supply of Yorkshire coal to these works.

Tottenham Heat, Light, and Power Company's Increased Price.

Mr. LOCKER-LAMPSON asked the Attorney-General as to whether the Tottenham and District Heat, Light, and Power Company were entitled to charge the increased price several weeks prior to the ordinary quarter ending, by an earlier reading of the meters.

Sir GORDON HEWART, in reply, said he thought so, subject to any special contract and to any provision to the contrary in the Company's special Act.

Gas and Coal (Emergency) Order, 1919.

Mr. NEAL asked the President of the Board of Trade whether his attention had been called to the serious inconvenience and loss caused to the public by the continuance in force of the Gas and Coal (Emergency) Order, 1919, forbidding the production of gas of a higher quality than 15 p.ct. below the prescribed quality; whether he was aware that manufacturers using gas for the treatment of metals had been compelled to cease such use by reason of the Order; and whether it was now possible to cancel the Order as the emergency—namely, the railway strike—has passed?

Mr. BRIDGEMAN: The Gas and Coal (Emergency) Order, 1919, was revoked on Oct. 28.

Coal Prices at Stoke-on-Trent.

Mr. FINNEY asked the Prime Minister whether his attention had been called to resolutions passed by the Stoke-on-Trent Town Council protesting against the action of the Government in making an increase of 6s. per ton on coal, as it was unreasonable and contrary to the report of the Coal Commission, against the action of the Coal Controller in compelling the purchase of coal for corporation undertakings by indirect methods resulting in an extra expenditure of thousands of pounds per annum, and also protesting against the anomaly created by arrangements made by the Coal Controller whereby coal from distant collieries was sent to Stoke-on-Trent while local coal was forwarded to other parts of the country.

Mr. BRIDGEMAN, who replied, said his attention had been called to the resolutions; but he did not agree that the increase in the price of coal was unnecessary, unreasonable, or contrary to the report of the Coal Commission. Coal had only been occasionally sent from Durham to Stoke-on-Trent to meet emergencies created by insufficient output from local pits. The despatch of coal from North Stafford was necessary in certain cases in which it was impossible to provide a suitable substitute, even though there was a local shortage. The whole question of coal prices was again under consideration.

ELECTRICITY SUPPLY BILL.

Supply of Energy Other than Electricity—Clause not Amended.

Standing Committee "B" last Wednesday reached and discussed clause 15 of the above Bill, in sub-section 2 of which appear words to which the gas industry (through representations made to members of the Committee by the National Gas Council) take exception. Sub-section 2 reads (the words in italics being the ones that are objectionable):

(2) A district electricity board and any company or person may, with the consent of the Electricity Commissioners, enter into arrangements for the utilization, for the purposes of the Board, of water power, waste heat, or other form of energy which the company or person may be able to dispose of, or for the supply by the Board of *any form of energy other than electricity*; and where such an arrangement has been made the district electricity board may be authorized by Special Order to exercise such powers (including the power to break up roads, railways, and tramways) as may be necessary for the purpose of conveying such energy.

Mr. G. BALFOUR moved in sub-section 2 to leave out the words "or for the supply by the Board of any form of energy other than." He said: My amendment is of the utmost importance. I understood we were discussing a Bill for the production and distribution of cheap electricity, and not for some other power like gas and water. I have read and re-read the clause to see if these words were in for some other purpose; but I have not been able to find it. We shall discuss a Bill presently for hydraulic supply; so this, obviously, cannot refer to water. These words seem to have slipped inadvertently into a Bill intended for electricity only.

Mr. SHORTT: On the contrary, these words are wanted very badly in the clause. It might, for instance, be possible to utilize some of the waste heat or other forms of generating power; and if this can be done profitably and beneficially, what is the objection? You might have steam for heating purposes, for example.

Mr. BALFOUR: This clause starts by saying that it is to enter into arrangements for the utilization of forms of energy which companies or persons can dispose of. This would give the right to provide some form of energy other than electricity—say, for example, the laying of pipes by a power gas company, or the supply of high-pressure water. I do not think that is the intention in the mind of the right hon. gentleman, and I certainly do not want these district boards to enter into all sorts of business enterprises not contemplated in the Bill. If the Bill becomes an Act of Parliament, could you not enter into some other enterprise totally different from the supply of electricity?

Mr. SHORTT: Not without the consent of the Commissioners.

Mr. BALFOUR: But is it contemplated as being within the scope of the duties of the Electricity Commissioners?

Mr. SHORTT: I have said it is subject to the order of the Commissioners. You will hardly find an Act of Parliament that some prize idiot could not abuse. If there is some side-show that can be utilized to advantage, surely no one is going to object?

Mr. CHAMBERLAIN: Would the right hon. gentleman accept the word "surplus" in front of the word "energy"? I think that my hon. friend (Mr. Balfour) has made out his case. These people could generate other forms of energy for disposal at a profit.

Mr. SHORTT: It is only the energy produced from surplus power that we are dealing with, and only power they do not require themselves.

Mr. CHAMBERLAIN: Then cannot we put in words that would make it clear?

Mr. SHORTT: It is possible that "surplus" would meet the case; but I am not sure at the moment.

Mr. BALFOUR: This is a fundamental question. I must reiterate that as the clause stands there is nothing to stop the Commissioners becoming an empowering authority to start a gas undertaking.

Mr. SHORTT: The Commissioners are there for the purpose of promoting and regulating the supply of electricity.

Mr. BALFOUR: That is exactly the point. Under the clause they have this specific power. They would, by their own Order, be able to grant power to supply gas or whatever other energy there might be.

The amendment was then put and negatived.

Mr. CHAMBERLAIN moved in sub-section 2, after the word "of," ["form of energy other than electricity"] to insert the word "surplus."

Mr. SHORTT: I do not think "surplus" would do there. You get a certain amount of waste power—waste heat—for the purpose primarily of generating electricity. You generate all you want; and if there is some over that can be used, as in America, for the purpose of supplying heat and hot water.

Mr. CHAMBERLAIN: Heat is a form of energy, whether it is hot water or hot air.

Mr. SHORTT: I can agree to the amendment, subject to consideration.

Mr. THOMSON: I hope the Home Secretary is not going to accept the proposal. Why limit the Commissioners? If they have surplus heat, why should they not distribute it? We are out for cheaper power and energy, and why seek to cripple the Commissioners?

Mr. NEAL: I am not sure the whole of this sub-section does not require redrafting. Suppose, for example, there is a colliery near one of these undertakings, and the production of power gas is possible. Is it intended that the district board shall be able to buy this supply of power gas and carry it where they wish, and, having got it, utilize it for their own purpose? And for what purpose? For the purpose of making electricity? If that is so, and the word suggested is inserted, then it would be such stock of waste energy that would be surplus and could be disposed of. As I say, the whole clause wants redrafting. I confess I do not understand it. If it means a general power to supply hot water through a public system to customers in the district, then I apprehend you will have no little difficulty in saying that this comes within the objects of the Bill. The object of the Bill, as stated in its title, is to amend the law in respect of the supply of electricity. Anything which is ancillary to the supply of electricity I should think, subject to your ruling, is germane to the object, and may be included in the Bill. But, however desirable it may be, I quite agree with my hon. friend Mr. Thomson that it is desirable that the authorities should be able to give all the amenities they can. This is a Bill to supply electricity, and when you are considering the insertion of these words, I would remind my hon. friend that he has the same words, "form of energy," two lines higher up; and the phrase should have the same meaning throughout the sub-section. Is it only surplus form of energy in line 39, or what precisely does it mean? I do not think anybody can tell us exactly what it does mean.

The question was put: "That the word 'surplus' be there inserted." The Committee divided: Ayes, 5; Noes, 9.

The following members voted "Aye": Mr. George Balfour, Mr. Bridgeman, Mr. Neville Chamberlain, Mr. Haslam, and Mr. Waddington. The "Noes" were: Sir William Barton, Commander Dawes, Viscount Elveden, Mr. Grundy, Captain Moreing, Mr. Neal, Lieut.-Colonel Roundell, Mr. Royce, and Mr. Trevelyan Thomson.

The CHAIRMAN pointed out that a great many members of the Committee did not vote.

Coal Treatment Processes.—A Company, with offices at Salisbury House, E.C., has just been registered under this title. The capital is given as £47,500, divided into 45,000 preferred shares of £1, and 50,000 deferred shares of 1s. each.

Darlington Gas-Works Profits.—The Darlington Corporation Gas-Works show a net profit for the year ended March, it was stated at the Council meeting last Thursday, of £7249. This has been placed to the reserve account. Mr. Dixon (the Chairman) stated that, owing to coal and other costs having increased, it would not be possible to reduce the price of gas; but they hoped to be able to carry on without an increase.

Not Surprised at Complaints at Retford.—Mr. Holleley, the Chairman of the Gas Committee, addressing the members of the Retford Town Council, said he was not surprised that they had complaints of the quality of the gas. The real cause was to be traced to the two strikes. The coal strike was serious, because the bulk of their coal came from Yorkshire, and only a fifth part from the Derbyshire pits. Through this strike they lost 650 tons of coal, which could never be recovered; and one result was that the pressure on the mains was reduced 20 p.ct. The situation in Retford was serious; and had the railway strike continued another three weeks, they would have had to cut off the gas supply altogether.

MISCELLANEOUS NEWS.

GAS CHARGES AGAIN BEFORE THE LONDON COUNTY COUNCIL.

At the last meeting of the London County Council, Mr. W. J. Bincombe asked the Chairman of the Public Control Committee the following questions: (1) What reply, if any, had been received from the Board of Trade in answer to the Council's representations as to the poor quality of the gas supplied in certain areas within the county. (2) Whether the Committee would consider the advisability of taking legal action to secure for the gas consumers a better quality of this commodity.

Sir George Bettesworth Piggott, the Chairman of the Public Control Committee, replied that, in answer to the first question, a letter, dated Oct. 29, had been received from the Board of Trade, intimating that they found it possible to revoke the Emergency Order, issued as a consequence of the recent railway strike, prohibiting gas companies from using a greater amount of coal in the production of gas than would suffice to produce gas of a calorific value not exceeding 425 B.Th.U. The revocation of this Order should effect some improvement in the quality of the gas supplied in London. The subject of the second question was continuously engaging the attention of the Public Control Committee, who were fully alive to the desirability of the Council taking all possible steps to secure the supply of a better quality of gas to London consumers. In this connection, he called attention to the statement by Sir Auckland Geddes in the House of Commons, in reply to a question by Mr. J. D. Gilbert, in which he said he was aware that gas undertakings generally were supplying gas of a lower calorific value than before the war; that this was being done at the present time with the approval of the Board of Trade, in order to ensure an adequate supply to all consumers during the coming winter; and that it was hoped shortly to introduce a Bill to give effect to the recommendations of the Fuel Research Board, whereby gas will be charged for according to the actual number of heat units supplied to the consumer, instead of by volume as at present.

FUTURE REGULATION OF THE SALE OF GAS.

The New Heat Standard.

In order that the risk of misunderstanding should be reduced to a minimum, Sir George Beilby (the Director of Fuel Research) adopted the excellent plan of inviting representatives of the newspaper Press to meet him. At the meeting he fully and clearly explained to them the proposals of the Fuel Research Board for the future regulation of the sale of gas to the public. These have now been accepted by the Government, as announced in a reply (which will be found on another page of this issue) of Sir Auckland Geddes, speaking as the President of the Board of Trade, to a question in the House of Commons. The reply gave promise of the early introduction of a Bill containing provisions "whereby gas will be charged for according to the actual number of heat units supplied to the consumer, instead of by volume as at present."

Sir George Beilby (who had with him Dr. Thomas Gray) in the first place drew attention to the main portions of the report of the Fuel Research Board on "Gas Standards," which led up to the present situation: and he then detailed the resolutions [*ante*, p. 237] which he declared he was proud and happy to say had resulted from conferences between diverse interests. So producers and consumers are now co-operating in a movement which will be for the national good. These conferences lasted from early in the spring until the end of last month; the resolutions referred to being finally carried at a meeting on Oct. 28. The following concise statement was made of the proposals as they are likely to affect the consumer.

In place of the present system, under which the consumer pays for all the gas which passes through his meter, however its heating value may vary from hour to hour or from week to week, and however these changes may affect the efficiency of his consuming appliances (stoves, gas-fires, gas-rings, and lighting burners) he will, under the new system, receive and pay for the heat units of 100,000 B.Th.U. calculated on the gas which passes through his meter.

The unit of 100,000 B.Th.U. will probably be called a "Therm."

The gas the consumer receives will be of constant calorific value—that is to say, the gas undertaking will hour by hour maintain the calorific standard which they have declared and adopted.

The burners of the appliances in which he consumes the gas will be adjusted gratis by the gas undertaking, so that gas of the standard supplied will be consumed with safety and efficiency.

The gas undertaking will maintain a pressure on their mains which will ensure that the gas of the standard supplied can be consumed with efficiency.

The new unit is one the practical meaning of which the consumer can readily grasp; for the "Therm" represents the amount of heat which, if the gas is applied with theoretical perfection, as it is in the gas calorimeter, will raise the temperature of

10,000	gallons of water	1° Fahr.
1,000	,, ,, ...	10° ,,
100	,, ,, ...	100° ,,
50	,, ,, ...	200° ,,

So that, if the water to begin with is at the ordinary temperature of (say) 50° Fahr. the consumption of 1 "Therm" will raise 60 gallons to the boiling-point.

SHEFFIELD GAS QUALITY AND COMPLAINTS.

Naphthalene Troubles.

Statements which have appeared in the "Sheffield Daily Telegraph" with regard to the gas supply are protested against by Col. H. K. Stephenson, the Chairman of the Sheffield Gas Company, on account of their misleading character. In the course of a letter to the Editor putting forward the facts, Col. Stephenson says:

I suppose it is almost unnecessary to say that the Sheffield Gas Company were, so to speak, milked dry during the war—the plant being worked to death and renewals of plant being unprocurable, even by the Department of the Ministry of Munitions, which undertook the task. Consequently, an immense task of reconstruction has confronted the Company since the armistice.

In 1918 the Government informed local authorities that they were not to ask for a higher standard of gas than 450 B.Th.U.; but up to the time of the railway strike the average quality supplied by the Sheffield Gas Company was some 500 B.Th.U. True, there were times when, owing to the demand for gas exceeding the capacity for production of the works, the pressure had to be reduced; while breakdowns of worn-out machinery, unsatisfactory labour supplied by the Government, and unsuitable coal supplied by the Coal Controller, together with irregularity in quality of coke-oven gas, caused occasional lapses from the high standard of pre-war days. Then came the railway strike, and with it a Government order that gas undertakings were not to supply gas of a higher standard than 425 B.Th.U. in order to conserve the coal supply.

Concurrently with the railway strike came atmospheric conditions—warm days and cold nights—which caused accumulations of naphthalene already in the mains to crystallize and block them up. Naphthalene troubles are common to all gas undertakings; and this is by no means Sheffield's first experience. But memories are short; and never before have we had the combination of mains impeded by naphthalene, coupled with a standard greatly reduced by Government decree.

That Sheffield is not alone in its gas troubles is obvious from the questions asked in the House in regard to the unsatisfactory gas supply in London; while a reference to the "GAS JOURNAL" will show that naphthalene does not even spare gas undertakings which are under municipal control.

So far as the Sheffield Gas Company are concerned, the most drastic steps are being taken to cope with the matter; and I have no doubt that on this, as on former occasions, they will be successful. I may add that gas "stripped" of certain components, as was supplied during the war, in order to assist in the manufacture of explosives, is more prone to deposit naphthalene than "unstripped" gas; while the lower quality of the gas now ordered by the Government to be supplied also tends to that end. During the period between the armistice and the railway strike the percentage of naphthalene in the gas had been reduced, so that the present trouble appears to be largely due to the crystallization of naphthalene which had been in the mains for a considerable period. The gas pressure during recent months has been the highest on record.

NOTTINGHAM GAS UNDERTAKING.

The Nottingham municipal election campaign revealed a feeling upon the part of a considerable number of electors that, in regard to the quality and price of gas which is at present supplied in the city, they are not being equitably treated.

The conditions imposing the necessity for increased rates have been more than once explained; and, in further elucidation of the matter, some information was afforded at a recent meeting by Mr. G. V. Hutton (a member of the Committee), who was seeking re-election. He did not suggest that consumers were getting all they wanted or had reason to expect from the department, but pointed out that conditions were entirely abnormal, and not of such a character that the responsibility could be said to rest entirely with the Committee. The total amount paid in wages in the department in 1914 was £62,400; but by March 31 last, it had risen to £82,000, while the estimated cost for the current year was £100,000. In 1914 the price of coal delivered at the works varied from 9s. 5d. to 14s. a ton; in 1919, it ranged from 27s. 2d. to 37s. 8d.; and the latter rate was being paid for Durham coal, which the city was forced to take. They were compelled to accept such quality of coal as Durham sent them—the result being that the value of the gas was lowered. The approximate amount of coal used during the past year had been 175,000 tons.

Replying to a suggestion that meter-rents should be abolished, Mr. Hutton pointed out that this could not be done except at the risk of a further increase in the price of gas, as the Corporation had to provide meters and keep them in repair. In 1914 the charge for gas locally was 2s. 4d. per 1000 c.ft.; but now it was 4s. 6d. If the pre-war quality of gas was given to the consumers, it would now cost roughly from 12s. to 14s. per 1000 c.ft. He did not think that they would ever see a return to the pre-war quality of gas, having regard to the price of labour and raw materials.

Belfast Gas Manager's Salary.—At a meeting of the Belfast Corporation, Mr. Dunlop asked whether any information had been received as to the Glasgow appointment for which Mr. J. D. Smith, the Engineer, had been an applicant, and in relation to which his salary in Belfast had been increased to £1760 a year, rising to £2000. He (Mr. Dunlop) noticed that an engineer had been appointed in Glasgow at a salary of £1500. Alderman Craig (the Chairman of the Gas Committee) said he believed £1500 was all the gentleman appointed had asked. Mr. Alexander moved, and Mr. Jamieson seconded, that an inquiry be held into the circumstances under which the increased salary to Mr. Smith was arranged; but this was negatived.

STOCKTON-ON-TEES VERTICAL RETORT SCHEME.

Ministry of Health Inquiry.

The Stockton-on-Tees Corporation having applied for permission to borrow £55,475 for the purpose of installing vertical retorts at the gas-works, the Ministry of Health ordered a public inquiry. This was held on Wednesday last, and was conducted by Mr. P. M. Crosthwaite.

Mr. T. DOWNEY, the Town Clerk, in explaining the Corporation's proposals, said that at the present time there were at the gas-works two benches of ten-bed retorts. Of one set, five were erected in 1890, at a cost of £3534. Five more on the same bench were erected in 1898, at a cost of £3098. The second set of ten was erected in 1902-3, at a total cost of £11,276. It was in respect of the first set that the application was made. These retorts were, in the opinion of the Gas Manager (Mr. Matt Dunn), unworkable as a business proposition. There was too much waste in connection with them; and it was desired to substitute them with vertical retorts. It was a matter of urgency. In 1914, the then manager reported to the Committee the need for a fresh installation. Steps were taken then to obtain tenders for the work; but, before anything definite could really be fixed up, the war broke out and definitely stopped them. Since that time the manager had patched-up the present retorts as best he could. But he had been working in the face of much difficulty; and what was urgent in 1914 was more urgent to-day. The manager had calculated that, on present-day prices, a saving of £12,757 would be effected annually with the aid of the vertical retorts which it was desired to instal. On working costs, £6870 would be saved, and on coal, owing to less being required, the reduction would be by about £10,887 while producing the same quantity of gas as at present. A deduction had to be made to meet interest and redemption; but the approximate saving would reach the figure stated. The question might be raised as to whether a supply of coke-oven gas could not be obtained, as was the case in the neighbouring town of Middlesbrough. Inquiries had, however, been made frequently since 1914 of firms likely to be in a position to supply coke-oven gas, and no one was able to give a supply sufficient for the town's purposes. Therefo e, they had to make their present application in order that they might rid themselves of obsolete plant and equip themselves better to meet the demand.

Mr. DUNN expressed the opinion that, in the early stages of their existence, the retorts which it was now desired to supersede were worked for all they were worth. All the goodness was taken out of them. Short-circuiting was very prevalent and troublesome in connection with them. They were not capable of any heat. In 1912, the output of gas was 447 million cubic feet. The works were then being run at a maximum. They had no safe margin; and if short-circuiting took place, it was necessary to reduce pressures in order to keep up with the demand. In 1913, the output was 432 million cubic feet; in 1914, 424 millions. Then came the war, which interfered with output. In 1918, the output was 423 millions; and this year it would border upon 450 millions. They were working at the full capacity of their retort-bench as it stood to-day, and were dangerously near a crisis. The whole point was as to whether the Corporation ought to spend a lot of money in patching-up the present plant, or go in for some improved scheme which would ensure efficiency. Since 1893, the working of the gas undertaking had resulted in £113,872 being handed over for the relief of rates.

Mr. T. WILKINSON, who opposed the Council's application, asked the gas manager when he estimated the retorts would be ready for use if the application were granted.

Mr. DUNN replied that they would be ready by the winter of 1920.

Mr. WILKINSON challenged the decision of the Gas Committee in not seeking outside expert advice. It was false economy to continue a system which was obsolete, as it was proposed to do. The scheme at present in hand would, he felt sure, cost nearer £100,000 than £50,000 in the end. The Gas Committee had not made the inquiries they might have done in regard to the utilization of coke-oven gas. They should study their Middlesbrough neighbours, who were the only authority to reduce their charge for gas during the war. Middlesbrough were now charging 2s. per 1000 c.ft.; whereas Stockton ratepayers were having to pay 3s. 11d. Stockton was paying a higher price for gas than any other large town in the North. He instanced the figures of eight large towns who were paying less. Four of these, he said, in reply to a question, had vertical retorts in use. He also mentioned six works within a six-mile radius of the gas-works that were using coke-ovens, and handed to the Inspector a slip of paper which he said bore the name of a firm prepared to negotiate with the Corporation respecting a supply of coke-oven gas from their works.

Mr. DOWNEY produced letters from four of the six firms mentioned, stating that they could not supply coke-oven gas, and added that the two others which Mr. Wilkinson had mentioned were so far away that they had been ruled-out of the question, seeing that a main of the size required would cost about £5500 per mile, besides having to pass through other local authorities' areas and cross the River Tees.

Mr. WILKINSON said he had only permission to hand to the Inspector the name of the firm willing to supply coke-oven gas—it could not be made public at present.

The inquiry then closed; and the Inspector visited the gas-works.

Irish Gas Workers' Wages.—At a conference between representatives of the Alliance and Dublin Gas Consumers' Company and their men in regard to wages demands, a threatened strike was averted by an agreement for an all-round increase of 5s.; the question of overtime and other grievances to be left for consideration by a further conference. The Omagh Urban Council had before them an application by the staff of the gas-works for a reduction of hours to 44 per week, all time worked in excess of this to be paid for at time-and-a-half. The Gas Committee recommended a 48-hour week, to be paid for at the rate of 6s. 8d. per day of eight hours, and time-and-a-half for Sunday work. The Council adopted the recommendation. The Ballymena Urban Council have decided to advance the wages of the stokers at the gas-works by 3s. per week.

PORTSEA ISLAND GAS COMPANY'S EXTENSIONS.

Owing to a steady and considerable yearly increase in the demand for gas, and to the impossibility of erecting new plant during the past few years, the Directors of the Portsea Island Gas Light Company have recently been faced with the necessity for extending their carbonizing plant.

An order has been placed with the Woodall-Duckham Company [*ante*, p. 238] for a complete installation of continuous vertical retorts to give 1½ million c.ft. of gas per day, allowing for 10 p.ct. of the retorts being off for scurfing. The contract also comprises electrical generating plant (gas driven), coal-wagon tipping and complete coal-handling plant, and a telpher installation. The designs and specification of the Engineer (Mr. T. Carmichael) provide for the addition of a second similar bench of retorts at a later date; and the coal and coke handling plant, &c., is to be of amply sufficient capacity to serve the complete 3 million c ft. installation.

The Company have recently erected at the Flathouse works a set of reinforced concrete coke and breeze bunkers; and a second set is under construction at the Hilsea works, where the new plant is to be erected. A third set will be put down in conjunction with the new verticals, and will be served by the telpher machines, which will also convey breeze to the forced-draught boilers. The new site is a clear one, and work will be commenced almost immediately. It is hoped to complete the whole plant and have it working by November, 1920.

Other extensions at Portsmouth comprise turbo-boosters for pressure reinforcement, coke-conveying and screening plant for the horizontal retorts at the Hilsea works, and a telpher installation at the Flathouse works, where there are already two sections of Woodall-Duckham vertical retorts. The Directors have also under consideration an extensive high-pressure scheme for reinforcing the existing low-pressure mains in the Southsea districts, as and when required.

BAHIA BLANCA GAS COMPANY, LTD.

Moving the adoption of the report for the year ended Dec. 31 last [*ante*, p. 193], at the twelfth ordinary general meeting of the Company last Wednesday (held at No. 1, East India Avenue, E.C.), Mr. F. C. IM THURN, the Chairman, said the shareholders had already been called together several times this year, in connection with the issue of participating debenture stock; and on each occasion the Company's position had been gone into.

It was, he went on to say, to be regretted that there was a loss of £7772 during the period under review, made up of the debit balance of revenue account £2913, and interest on loans and advances £4859. Turning to the revenue account, which gave the details of the working, and comparing it with the figures for 1917, expenditure was up some £6142, and interest was increased by £375, making the total increase on the debit side £6517. This was counterbalanced by an increase in receipts of £6941, with the net result that, when compared with 1917, the loss on the year's working had been decreased by £424. Though this was not very pleasant hearing, he would like to say that the period under review had been one of extreme difficulty (even compared with the previous strenuous years), on account of the continued effect of the European war on the fuel market. The price of coal during 1918 was prohibitive; and, as they would have seen from the Directors' report, extensive experiments had been made with various classes of fuel, with a view to reducing the cost of gas. As a result of the manager's research work, the construction of a generator to enable gas to be more effectively made from wood and oil was commenced in September, 1918. Many difficulties had to be surmounted. Suitable materials were not available; and the bricklayers were incompetent, and had to be replaced three times, on account of bad workmanship. But, notwithstanding these troubles, the preliminary trials commenced in February last, and in May the total output was being produced from the new apparatus, although during the period of the greatest consumption (in June and July) the supply had to be augmented by the use of one bed of retorts. The carbonization of coal was discontinued altogether in December; the proportion of it used having been previously reduced to 10 per cent. of the total weight of combustible carbonized. From that date onwards, gas was made exclusively from wood and oil, because, though the cost of these materials had increased enormously, compared with the prices obtaining at the time they were first employed for gas making, used in conjunction with the generator they were still cheaper than coal. To give an example, crude petroleum in August, 1918, cost nearly three times as much as it did in 1916, though he was pleased to be able to say that in January of this year the price took a downward turn. The Company's relations with the national, naval, and municipal authorities continued to be of the most friendly nature; and the Directors had again to place on record their appreciation of the help received from these sources. He did not think that any further comment was necessary with regard to the recent issue of participating debenture stock. This stock was offered in the first place to the shareholders, who took up 68 p.ct. of the issue; the remainder going to the underwriters, with the result that all the Company's debts had now been paid, and they were left with some £10,000 of working capital in hand. The general opinion had always been that Bahia Blanca would develop rapidly; but since 1914 the number of inhabitants had, to all appearances, kept stationary. On the other hand, the Government had been spending considerable sums in irrigation works on lands on the Neuquen section of the Southern Railway, and also on the Patagonia section of the Pacific Railway system; and as the Port of Bahia Blanca was nearest to these districts, it was expected that the town would derive considerable benefit as agriculture became developed. With the prospects of Bahia Blanca improving, therefore, the Company's future appeared to be brighter than it had done for some years. Since the last ordinary general meeting, Mr. P. A. Cooper and Mr. F. G. Cockey had been elected as Directors of the Company. Another change in the personnel in London had been brought about by the resignation, in March last, of Mr. W. Upton, who had been

connected with the Company since its inception, and who had very ably carried out the duties of Secretary since 1910. The Directors were very sorry indeed to lose his services; but for reasons of health it was necessary for him to reside out of London. He was pleased to put on record the Board's appreciation of his past work. Mr. M. Denne was appointed Secretary in his stead. He did not think his remarks would be complete without a reference to the arduous and trying time their manager in Bahia Blanca, Mr. A. M. Hunter, had had during the period under review. It was evident to the Directors that, had it not been for the extraordinary initiative and resource shown by Mr. Hunter in overcoming the many and almost insurmountable difficulties which continually cropped-up, they would have had to shut-down long ago. But not only had he been successful in maintaining the supply of gas—and, in fact, increasing the consumption during 1918—but despite the exorbitant prices of fuel and other difficulties, the working for 1918 showed a comparatively small loss. He therefore wished to express their great appreciation of the efforts of the manager and his staff during 1918.

The report and accounts were adopted without discussion; and the retiring Directors (Mr. P. A. Cooper and Mr. F. G. Cockey) and the Auditors (Messrs. Arthur Goddard & Co.) were re-elected.

SWANSEA GAS COMPANY'S WELCOME HOME.

Dinner to Employees Returned from the Forces.

The employees of the Swansea Gas Light Company entertained at a "Welcome Home Dinner," at the Exchange Restaurant last Wednesday, those of their comrades who have returned from service in the war. The greater portion of the Company's employees were present, and a very enjoyable musical evening was spent. After the Loyal Toast,

Mr. SAMUEL DAVIES (Messrs. Willey and Co.) proposed the toast of "The Swansea Gas Light Company." He referred to his 22 years' association with the Company, during which period the management has undergone four changes. He congratulated Mr. George Andrews upon becoming Vice-Chairman of the Board, and also congratulated Mr. R. G. Clarry upon his new appointment as General Manager to the Dyffryn Steel and Tinplate Works. In welcoming the new Engineer and Manager (Mr. W. H. Johns), he said he was sure the Company had before it a highly successful future—particularly having regard to the increasing demand for gas due to its economic value.

Mr. GEORGE ANDREWS, in reply, expressed his pleasure at being present, and commented on the new works at Morriston, which are now being rapidly proceeded with.

Mr. W. H. JOHNS, who also replied, remarked that he felt greatly honoured at being Engineer and Manager to an undertaking so highly placed in the industry as the Swansea Gas Company.

Mr. ERNEST ABLETT (Secretary and Assistant Engineer), who presided at the dinner, proposed the toast to the returned ex-service men. In doing so, he sketched briefly the part played by those employees who had served with the forces. He assured them that the number of those who served constituted an admirable percentage of the eligible men of the Company. Their "boys" had seen service in every branch. To the honour of those who had made the supreme sacrifice, they hoped later to unveil a memorial at the works. On behalf of the officials and workpeople who had carried on during their absence, he thanked them for their service, expressed great pleasure at having them back again, and extended to them a sincere and hearty welcome home.

Chief Petty Officer CAPLIN replied on behalf of the Navy, and Private PEARSON, D.C.M. and Croix de Guerre, for the Army.

Mr. S. DUNN, proposing "Our Guests," referred to the Directors and managers of the Company, and to their interest in the welfare of the employees.

Mr. R. G. CLARRY, responding, expressed great delight at being once again among the employees, particularly at such a welcome home dinner. He was glad to say that in his new sphere he was receiving the co-operation and loyalty from the workpeople which was one of the outstanding characteristics of his long connection with the Gas Company.

Mr. E. H. LEEDER (a member of the Board) expressed the Directors' appreciation at being invited to such functions, where good feeling and good fellowship so obviously existed.

Gas Profits and the Rates.—A resolution was on the agenda for the meeting of the Manchester City Council yesterday [Monday], in favour of appointing a Special Committee to inquire into the present system of using the profits of trading committees in relief of rates, and the desirability of reducing the price of gas and electricity to a figure which will cover the fixed charges and cost of production—any surplus to be applied to the repayment of borrowed capital.

East Grinstead Council and the Gas-Works.—The East Grinstead Urban District Council have agreed to a recommendation of the Gas and Water Committee that they should, "in consequence of the unsatisfactory gas supply, and the difficulties of separating the two undertakings," inquire whether the Gas and Water Company would be prepared to sell both of them. One member said he thought it would be a mistake to buy such an undertaking, in view of the Council's electric light scheme being started at an early date.

Price of Gas at Teignmouth.—The Ministry of Health have replied to the Teignmouth Urban District Council's application for a further Order under the Temporary Increase of Charges Act to empower them to increase the price of gas beyond the present maximum. The Ministry suggest that the matter should be considered at the local inquiry which will be held in connection with the Council's application for a loan for the proposed alterations and additions to the gas-works. The Council further discussed the subject last Tuesday, and instructed the Clerk to write to the Ministry pointing out the serious financial position of the gas undertaking, and urging in the strongest possible manner that the Order be granted forthwith.

HISTORY OF GAS IN BIRMINGHAM.

Mr. W. A. Twine, A.I.C., A.M.I.Mech.E., the Chemical Works Superintendent at the Birmingham Gas-Works, delivered an interesting lecture on "The Working-Up of Residuals from a Gas-Works" last Wednesday evening at the University of Birmingham, under the auspices of the Workers' Educational Union. Dr. E. W. Smith, the Chief Chemist at the Birmingham Gas-Works, presided over a large attendance. In introducing Mr. Twine, he stated that during the period he had held the position of Chemical Works Superintendent greater advances had taken place in the conservation of coal and in utilizing bye-products than in any previous period of the department.

The lecturer stated that for twenty years he had been engaged in the working-up of residuals from gas-works. It was exactly a century ago since the Birmingham Gas Light and Coke Company was inaugurated by Royal Charter; and in the office of the Manager of the Birmingham Gas Department there was a framed gas bill, for the old Cannon Street Chapel, for a quarter's supply—8900 c.ft. of gas at a charge of 15s. per 1000. At that period the Birmingham two gas-works were situated at Gas Street, off Broad Street, and at Fazeley Street. Prior to 1875, there were two companies supplying gas in the town; and in some instances one company had the mains up one side of the street, and the other company ran along the opposite side. On Sept. 1, 1875, the business of the Birmingham Gas Company was transferred to the Corporation at a price of £450,000; and Jan. 1 of the following year saw the transfer of the business of the other concern—the Birmingham and Staffordshire Company—for which perpetual annuities amounting to £58,290 were paid.

Very few persons comparatively had any idea of the size of Birmingham's gas undertaking. The present area of the works was equal to about 100 acres. Over 3000 tons of coal per day were carbonized—a figure representing a procession of 2000 carts over 6 miles long—and they had used as much as 30,000 gallons of oil for gas making. The figure to-day was 22,000 gallons, representing a procession of 44 oil-carts half-a-mile long. From 100 tons of coal the Corporation obtained approximately: Coke, 70 tons; gas, 1,100,000 c.ft.; ammoniacal liquor, 7·8 tons; tar, 5·35 tons; and then from the gas, cyanogen 107 lbs., and sulphur 950 lbs. The Birmingham works stood third for size in the United Kingdom; and the amount of gas made was about 5 p.ct. of the total output of the United Kingdom. The department owned 1500 coal and coke trucks, and nearly as many again, which were hired, were used for conveying coal and coke.

Mr. Twine described in detail, with the aid of photographs and drawings, the principal plant of the gas-works and of the residuals works. He mentioned that during the war the normal activities of the latter were disturbed, in that huge quantities of material for making high explosives were made for the Government. They hoped that in the near future a normal position would be reached, and that when the tap was turned on they would get adequate pressure and luminosity. They would probably never get back to the old luminosity, with great jets without mantles. What was wanted was a good light with an incandescent mantle. This change meant that gas-works were able to take benzol out of the gas. Tens of thousands of gallons of this spirit were obtained in Birmingham, and which, as time proceeded, would be used in increasing degree for motors and industrial motive power. There seemed every reason why there should be greater inter-trading among the industrial concerns in a given area. The point the Birmingham Gas Department intended to maintain was a gas with a high calorific power.

Dealing with the residuals, the lecturer mentioned that the time occupied in charging the retorts with 10 or 11 cwt. of coal was 30 seconds, and that, within this time, the previous charge was sent out in the form of coke. He exhibited some fine photographs of the new vertical retorts, and the plant for the extraction of benzol—the first to be erected for the Ministry. The primary products from the residual works were ammonium sulphate, which was largely used as an artificial manure; ammonium sulphide, used in salt works; ammonium hydrate, used in salt and soda works, and in the washing of wool and cotton; ammonium chloride, for galvanizing iron and for effect in cotton printing; ammonium carbonate, used in biscuit manufacture, baking powders, &c.; and ammonium nitrate, used in the manufacture of explosives. As to the use on the land of sulphate of ammonia, Mr. Twine gave statistics showing that those countries which employed ammonium sulphate in cereal and wheat cultivation obtained the largest yield. The English farmer needed to be educated upon this matter. The Birmingham single unit plant could make 40 tons of sulphate per day. Sulphuric acid was of enormous value in the iron industry for pickling purposes. Ammonium carbonate was quite as effective as good baking powder. Huge quantities of ammonium nitrate were produced by the department for making explosives for war purposes. From 100 tons of coal 5½ tons of tar (about 1000 gallons) were obtained. Mr. Twine then enumerated the products of the tar-stills, and their uses.

Dr. SMITH said one of the most interesting points Mr. Twine had brought out was the fact that Birmingham was now, and had been for many years, a leader with regard to gas undertakings. It was due not to any one man or any set of men; it was largely due to a go-ahead policy on the part of men from Mr. Joseph Chamberlain downwards. The requirements for coal gas in the past were different from the requirements of the present time; and there would be no attempt to go back to the quality given in 1910, because if that were done the price would probably be 25 p.ct. higher. It was better to have gas of constant quality than one which was variable. Birmingham sold a great deal of its gas to industrial users, and constancy of pressure, volume, &c., was more important than actual high quality. The only reason for thinking of supplying a gas of lower quality than in the distant past was that, on a heat-unit basis, it should be produced and sold cheaper.

The West Bromwich Gas Committee, in connection with the limited supplies of coke, announce that the bakers and other food producers are to have preference, then schools; and that the rest is to be divided as fairly as possible between industrial and other users.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 10.

The London pitch market, in sympathy with the strength of Provincial pitch prices, remains very firm at over 80s. net per ton. While some Continental buyers may not realize the cause and reasonableness of the present value, they will yet inevitably have to accept the situation shortly in order to obtain supplies. There is nothing new to remark about other products, which are unchanged.

There is still no free market for the export of sulphate of ammonia. For the home agricultural market, prices remain on the basis arranged.

Tar Products in the Provinces.

Nov. 10.

The average values for gas-works products during the week were: Gas-works coal tar, 38s. to 43s. Pitch, East Coast, 70s. to 72s. 6d. per ton f.a.s.; West Coast—Manchester, 62s. 6d. to 65s.; Liverpool, 62s. 6d. to 65s.; Clyde, 72s. 6d. to 75s. nominal. Benzol 90 p.ct., North, 1s. 8d. to 1s. 10d.; crude 65 p.ct. at 120° C., 1s. c½d. to 1s. 1½d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 8d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 2s. 3d. to 2s. 4d. Heavy naphtha, North, 2s. 1d. to 2s. 3d. Creosote, in bulk, North, liquid, 5½d. to 5⅝d.; salty, 4⅝d. to 5d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct., 1s. 6d. to 1s. 6½d. Naphthalene, £15 to £17 10s.; salts, £4 10s. to £6, bags included. Anthracene, "A" quality, 7½d. to 8d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is not much change in the situation, and a good deal of uncertainty continues to prevail in many directions. Pitch remains strong; and exports are being made in fair quantities to Spain. Stocks have practically been cleared off. Benzol is much wanted; and the demand for motor purposes should increase considerably. I understand that the test undertaken to prove the value of benzol as a motor fuel ended last week, and that the results are to be published in a day or two. Coming as this does during the greatest motor show on record, it should lead to a considerable increase in the use of benzol. Creosote has been wanted for fuel purposes in view of the shortage of coal. Carbolic acid is stagnant, and other products are unchanged.

The range of quotations is as follows:

Benzol: 90% London 2s. to 2s. 2d., North 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 10½d. North; crude, 60-65% 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Carbolic Acid: Crude 60's 1s. 6d. per gallon nominal; crystals, 40%, 7½d. per lb.

Crude Tar: London, 50s. to 55s.; Midlands, 50s.; North, 50s. per ton *ex* works.

Pitch: London, 80s. to 82s. 6d. per ton; East Coast, 72s. 6d. to 77s. 6d. per ton; West Coast, 70s. to 72s. 6d., with Manchester 70s. per ton and Glasgow 72s. per ton; South Wales, 64s. to 68s. per ton.

Solvent Naphtha: London, 2s. 6d. Provinces average 2s. 7d. per gallon.

Crude Naphtha: Naked, 9d. per gallon.

Heavy Naphtha: 2s. 5d. per gallon.

Naphthalene: Refined, £16 to £18 per ton nominal; crude, £6 5s. to £11, according to quality.

Toluol: Naked, 2s. 6d. per gallon nominal. North, 2s. 5d. Pure, 3s.

Creosote: London, 7¼d.; North, 5⅞d. to 6¼d.; heavy oil, 6d. per gallon in bulk.

Anthracene: 40-45%, 7d. to 7½d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

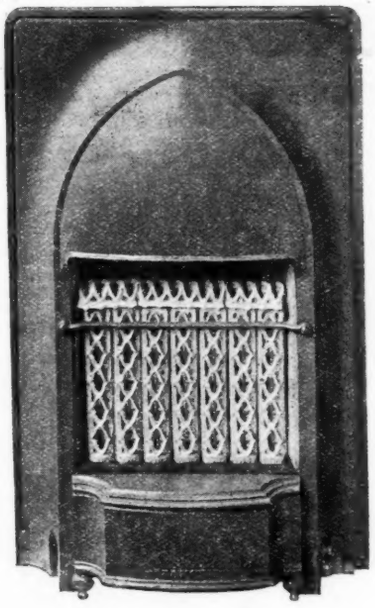
Aniline Oil: 1s. 3d. per lb.

Cresylic Acid: 95%, 2s. 5d. to 2s. 6d.; 97-99%, 2s. 7d. to 2s. 8d. *ex* works London, f.o.b. other ports.

Sulphate of Ammonia.

This material is passing very freely; and there are very little stocks on hand anywhere. It is still suggested in some quarters that the prices for sulplate of ammonia are too high; but when the whole circumstances are taken into consideration, it does not seem that the complainants, who are mostly spoon-fed agriculturists, have any grounds for their alleged grievance. In spite of the advance in quotations, sulphate of ammonia is by far the cheapest nitrogenous fertilizer on the market. Export business is increasing slightly; but home needs will not at present allow much expansion in this direction. Some profitable sales for export have taken place at £24 per ton for cash. Continental farmers evidently do not object to paying this figure, *plus* freight, or something like £25 per ton, for their fertilizer.

Extensions at Ashton-in-Makerfield.—An application for sanction to borrow £51,000 for vertical retorts, condensers, and storage at the Ashton-in-Makerfield Gas-Works, has been the subject of an inquiry by Major J. Stewart for the Ministry of Health. It was stated that the total net saving through the introduction of this system, compared with the present system, would be £3307, which would pay the interest on the money borrowed, and show a considerable surplus in addition. The system, it was said, would also introduce heathier conditions of work for the stokers. In the course of the evidence, it was stated that the leakage, owing to mining subsidences, was 15 p.ct. on the amount of gas produced, but that the loss from this cause had been cut-down owing to the substitution of cast-iron mains for steel.



NEW "MAIN" FIRES.

THE new "Gothic" Gas Fires are now ready—also many other new designs. Every "Main" Fire will give daily dividends of comfort to your consumers. Don't allow the old type wasteful Gas Fires to continue in use. Replace them with "Mains," so making the most of your output and adding satisfied customers to your list for the good times ahead.

What quantity of New "Main" Lists may we send you?

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 6, Narrow Wine Street, BRISTOL; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE.

Burned to Death in a Gas-Main.

Circumstances of a shocking fatality, resulting from the burning to death of a man in a gas-main, were investigated at an inquest at Ilkeston on Saturday; the victim being Thomas Lynch (aged 37). Thomas Shelton, a labourer, stated that on Thursday last he was working with the deceased, who was a bricklayer. Lynch, carrying a lighted paraffin lamp, went into a gas-main, with a bucket of "loom," to plaster it up, and told witness to remain outside. Twice he came back with his hands on his head; and witness advised him not to go back. He replied, however, "I shall go back if it kills me." He went back; and witness shouted twice. Not getting any reply, he ran for assistance. John Brentnall Wheatley, foreman bricklayer, said he sent Lynch to examine the stoppings. His last words to Lynch were that, if there was any gas in the tube, he must not go in at all. Some time afterwards he was informed that Lynch was in the main, and that no reply could be got from him. He entered the tube, and on reaching Lynch found him on fire, sitting in an upright position. Witness tried to drag him out, but could not do so on account of the heat and the gas. He had to struggle to get back himself; being nearly overcome. Lynch was dead when he reached him. His clothing had been set on fire by the paraffin lamp. Dr. Dobson said that Lynch's head, neck, arms, and trunk were "practically cooked," but his legs were burnt in less degree. In his opinion, the man was overcome by the gas. The general appearance of the face was consistent with death from carbon monoxide poisoning. He was dead before he was burned. In recording a verdict of "Accidental death," the Coroner suggested that the fact that this main had not been in use for 14 years should have led to stricter precautions being taken. The manager of the works said that Lynch was one of the best workmen he had ever had. If he had a fault, he thought it was that he studied his employer's interest before his own personal safety.

Purifier-House Fire at Poplar.—Some oxide became ignited in the basement of the purifier-house at the Poplar works of the Commercial Gas Company; but the flames were prevented from reaching other parts of the works. Protective apparatus had to be sent for before the firemen could deal with the outbreak.

The Thermal, Industrial, and Chemical Company.—This Company, which has lately been registered with a capital of £7500 in £1 shares, has among its first Directors Sir Arthur Duckham and Sir W. J. Jones. The objects include the carrying on of business as gas engineers, manufacturing chemists, &c.

Coke Breeze and Storage Accommodation.—The Highways Committee of the London County Council report that, now coke and coke breeze are being used, in addition to coal, at the Greenwich power station, the capacity of the bunkers is seriously reduced by the necescity of keeping the different kinds of fuel separate. It is therefore proposed to carry out certain alterations, the cost of which is estimated not to exceed £3000.

Strange Suicide at a Gas-Works.—A youth named Reginald Albert Peasey, employed as a labourer at the Plymouth Gas-Works, committed suicide in an extraordinary way last week. He complained to a fellow workman during the afternoon that he was not well, and felt like drowning himself. An hour or so later he was found dead in an ammoniacal liquor well. At the inquest, evidence was given that death was due to asphyxiation; and a verdict of "Suicide while temporarily insane" was returned.

Stafford's New Vertical Retorts.—The Stafford Town Council have received intimation from West's Gas Improvement Company, the Contractors for the new vertical retorts at the gas-works, that they have incurred considerable expenditure above the contract price in respect of manufacture and erection, as the direct outcome of the war. Negotiations were entered into, and the Contractors agreed to accept the sum of £6250 on this account. It is stated that the total extra outlay by the firm was £9400. The sum agreed upon was in addition to the original contract price of £20,000. The work has been carried through by the Contractors without any hitch or trouble; and the new plant is working to the entire satisfaction of Mr. W. M. Valon.

Leeds Gas-Works Handicaps.—The handicaps placed on the Leeds Corporation Gas-Works through the recent strikes have been such that it has been found necessary to warn consumers to use as little gas as possible, for fear a sudden demand, by reason of two or three dark winter days, may find the supply inadequate. The various strikes have prevented the department carrying out necessary repairs and renewals. In turn, work was interfered with by the miners' strike (with whom came out the clay-getters), the railway strike, and the iron-moulders' strike, the latter of which is still unsettled. The result is that there are still three batteries of retorts incomplete, which means the loss of a 3 million c.ft. output per day. One battery is finished with the exception of the iron mouthpieces, which are held up by the moulders' dispute.

Disposal of Gas Profits at Keighley.—At a meeting of the Keighley Town Council last Tuesday, on receipt of a report on the working of gas department, it was decided that, out of the profits of £10,562, the sum of £625 should be transferred to the relief of rates, £50 should be given to the Victoria Hospital, £6000 be transferred to working capital, and the remaining £4512 be carried forward. Mr. J. Longton announced that in about two-and-a-half years it might be expected that the works would be freed from debt, with the exception of about £5000. He understood the insurances stood at £83,000, and there were large funds—something over £22,000—besides these. He thought something more should be done to relieve the rates. Mr. W. Coleman objected to the use of trading profits for this purpose. The proper thing to do with gas profits was to reduce the price of gas. Mr. T. Wardle also asked for cheaper domestic gas. Mr. A. Smith suggested that there would still be a profit of 3d. per 1000 c.ft. if the price were reduced 4d. Mr. W. H. Murgatroyd pointed to the prospective increase in expenditure in the coming year of £9300, as against the real profit this year of only £5600, and said the price of gas would probably have to be increased.

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

New Gas Companies in Scotland.—The Largo and Lundin Links Gas Company, Fife, has been registered as a private company, to take over the business carried on by the Largo and Lundin Links Gas Company. The capital is £15,000. The Kennoway and Windygates Gas Company, Fife, has been registered, to take over the Kennoway and Windygates Gas Company. The capital is £15,000 in this case also.

Liquidation of the Auer Company.—According to the "Ironmonger" column of "German News," at the general meeting of the Auer Company, an entirely new offer was made by the Syndicate which has been formed by the National Bank. It is now proposed to take over the whole property of the Auer Company at the price of 51 million marks; and at the same time to assume responsibility for all liabilities arising out of the liquidation.

Electric Light Failure at Hull.—Last Tuesday was an unusually dark day in Hull, and in the afternoon lights were required everywhere; but unfortunately just at this time there was a failure of the electricity supply in the Old Town, which caused much temporary inconvenience in offices and shops. However, the fault was located and repaired by the Corporation Electricity Department within about two-and-a-half hours of the mishap.

Largely a Question of Pressure.—Interviewed by the representative of a local paper as to the probability in the near future of an improvement in the gas supply of Birmingham, Mr. Arthur Smith (the Secretary of the Gas Department) said that there was a good deal of misapprehension among the citizens as to the cause of the recent poor lighting. It was largely a question of pressure. The type of coal which they were forced to accept was productive of naphthalene, with which the mains and service-pipes soon became choked. The particular solvent used before the war had been unobtainable during the past five years. But the fitters were now hard at work removing the accumulation; and a special plant was being erected at the works for obviating a recurrence of the nuisance. A great number of the complaints were due to bad adjustment of burners and faulty aeration.

Purifier Explosion at Margate Gas-Works.—There was a somewhat alarming experience at the Margate Gas-Works last Wednesday morning. On opening one of the boxes of the elevated set of purifiers, for the purpose of removing the oxide, rapid internal heating took place; and an explosion of the gas between the layers of oxide rather seriously damaged the Pickering valve. Flames shot up from the burning gas; but fortunately only very slight personal injury was received by three men, who were all at work again the following day. The town was supplied during the daylight hours from the gas in the holders; but this was exhausted by about 6.30 on Wednesday evening. The water which had been used for extinguishing the fire in the purifiers passed down into the mains, and some time was occupied getting them thoroughly clear; while repairs were necessary to the Pickering valve controlling the set. However, Mr. J. M. Campbell (the Engineer and General Manager) was able to restore the supply of gas to the town by 6 o'clock on Thursday evening.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Nov. 5.]

Nos. 26,259—26,917.

ADNITT, W. D.—"Atmospheric gas-burners." No. 26,717.
ANDERSON, W.—"Process of treating coal tar, &c." No. 26,759.
BROWN, W. D. R.—"Apparatus for the automatic and continuous analysis and recording of gases." No. 26,640.
CLARKE, J. B.—"Rotary pumps and exhausters." No. 26,419.
CUBLEY, H.—"Gas-heated crucible furnaces." No. 26,853.
DAVEY, H. N.—"Explosion gas turbines." No. 26,857.
HARVEY & Co., M.—See Cubley. No. 26,853.
HUGHES, G. A.—"Lighting of cities, encampments, &c." No. 26,753.
JEFFERY, W. G.—"Gas-compressor." No. 26,642.
LONDON ELECTRIC FIRM.—See Hughes. No. 26,753.
M'LEOD, H. N.—"Apparatus for the carbonization and distillation of moist carbonaceous materials." No. 26,833.
MARDEN, F. H. E.—"Utilizing combustion gases of fuel for generating steam mixed with these gases, &c." No. 26,601.
MILLER, A. J.—"Burner or nozzle for gas heating." No. 26,687.
MITCHELL, F. B.—"Turn-cocks, supply-taps, &c." No. 26,558.
O'BRIEN, A. M.—"Production of liquid fuel for motive power, heating, or lighting." No. 26,385.
PEASE, E. L.—"Extraction of ammonia from gases, &c." No. 26,589.
PICKSTON, W. T.—See Brown. No. 26,640.
TOOGOOD, V. M. L.—"Coal substitute." No. 26,359.
WILSON, J.—"Means for supporting incandescent gas mantles." No. 26,752.
YATES, H. JAMES—"Atmospheric gas-burners." No. 26,717.

A new booklet issued by Messrs. A. G. Sutherland, Ltd., of Warwick Road, Greet, Birmingham, gives particulars of the dry gas-meters made by the firm, together with some excellent photographs of the new factory erected by them specially for this class of work.

Among the retiring councillors who were defeated at the recent municipal election at Derby was Mr. J. Ferguson Bell, the Engineer of the Derby Gas Company. He was beaten by a labour man. Mr. Bell ran as a Conservative; and his defeat will be a distinct loss to the Council and the public life of Derby.

The Ministry of Munitions commenced during the war the erection of a factory covering 271 acres at Billingham-on-Tees, the chief purpose of which was the fixation of atmospheric nitrogen; and when hostilities ceased, the work of construction was stopped. The Government have now decided that further development should be left to private enterprise.

"PIONEERS" OF BLUE WATER GAS
FOR "JOINT USE" WITH COAL GAS.

DEMPSTER'S COMBINATION OF

C-W-G- AND
BLUE WATER GAS

APPARATUS "IS NECESSARY."

R. & J. DEMPSTER, LTD.,
MANCHESTER.

Temporary London Office:
BLENHEIM MANSIONS,
BROADWAY, WESTMINSTER, S.W.1.
London Office Telephone No. Vic. 7426.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange last week was plentiful enough if only one looked for it in the right quarters, and those were where the piquant element of speculation was strong. Here things marched merrily until Thursday, when the rise in the Bank rate somewhat damped the enthusiasm; but adventurous speculation was raising its head again before the close.

The gilt-edged market held aloof, and Home Government issues of all descriptions weakened. The position at the close was unsettled—Friday's marked prices being wide. Then Consols ranged between 50¾ and 51¼, War Loan 91¼ and 92, Funding 75 and 76¼, and Victory 81¾ and 83¼. Home Rails were flat throughout; Canadians easier; Argentines reacting.

The Foreign Market continued weak on the whole. Russians, Greeks, Norwegians, and Mexicans gave way; but Belgians were firm, and French at times made some recovery. In Miscellaneous, Rubber was firm, and Oil was very active and strong, barring a little setback on Thursday. Shipping, Insurance, and Breweries were in favour.

Business in the Gas Market was very fair in point of volume; and the tendency of prices was decidedly encouraging. The London Companies showed increased strength; and the Gas Light ordinary quotation rose 2, and South Metropolitan 1. Suburban and Provincial were steady as a rule; but a transaction at 90 in Hornsey 7 p.ct. pulled it down. Monte Video made a big jump of 11. Minor advances were marked in Cape Town preference, Hong Kong, Imperial Continental debenture, Malta, Oriental, and Primitiva both issues.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 59⅜, 61, Imperial Continental 133, 134, ditto debenture 82, Monte Video 71, Primitiva 32s. 6d., 33s. 9d., South Metropolitan 58½, 59, 59¼, 59½. On Tuesday, Brentford "A" 55, Commercial 4 p.ct. 56, ditto 3½ p.ct. 52, Gaslight ordinary 60, 60½, 61½, ditto preference 66, Imperial Continental 133, 134, 135, 135½, Primitiva 32s. 6d., ditto preference 67s. 6d., 68s. 9d., South Metropolitan 59½, 59¾, 60. On Wednesday, British 25, 25¼, Commercial 4 p.ct. 55, ditto 3½ p.ct. 50, Gaslight ordinary 61, 61½, ditto maximum 45⅝, ditto preference 66, 67, Imperial Continental 133¾, 134, 134¾, 135½, Primitiva preference 67s. 6d., 68s. 9d., Tottenham "A" 75. On Thursday, Brentford "A" 56⅛, ditto "B" 54, Gas Light ordinary 61, 62, Imperial Continental 134, 134½, 135, 136, Monte Video 78, 80, Primitiva preference 67s. 6d., ditto debenture 51½, South Metropolitan 59½, 59⅜, ditto preference 94½, 95, ditto debenture 52½, Tottenham "B" 54. On Friday, Brentford "A" 56½, Commercial 4 p.ct. 56, Gas Light Ordinary 61, 61½, 62, ditto maximum 45½, ditto preference 66½, Hornsey 7 p.ct. 90, Imperial Continental 133½, 133¾, 134, 135, 136, ditto debenture 83¾, Monte Video 80, Primitiva 35s., 36s., 37s. 6d., South Metropolitan 60⅜, 60½, 61, Harrogate 5 p.ct. debenture 80½, Hornsey 10 p.ct. "A" 130.

In the Money Market, steadily increasing demand foreshadowed the actual advance of the Bank of England rate to 6 p.ct. on the 6th inst. from the 5 p.ct. fixed on April 5, 1917. This advanced somewhat disordered the market for awhile; but ere long matters began to settle down.

The coal famine in Paris has reached so acute a stage that at times it has been impossible to maintain the full electric light service.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices, July 25, 1914.	Present Prices.	Lowest and Highest Prices of Bargains
129,049	Stk.	July 31	4	4%	Aldershot 4 p.c. Pref.	..	80—85	..
1,551,868	"	Sept. 26	2½	2⅞	Alliance & Dublin Ord.	52—54	43—48	..
374,000	"	July 11	4	4%	Do. 4 p.c. Deb.	76—79	60—62	..
280,000	5	Oct. 30	7½	8%	Bombay, Ltd.	5⅞—6⅛	2½—5⅜*	..
50,000	10	Aug. 28	16	12%	Bourne- { 10 p.c.	29—30	19—20	..
388,110	10	"	7	7%	mouth Gas { B 7 p.c.	15—15½	10—11	..
115,000	10	"	6	6%	and Water { Pref. 6 p.c.	12½—14	9½—93	..
159,740	—	June 27	—	4%	4 p.c. Deb.	..	85—87	..
993,045	Stk.	July 11	14	37/-	Brentford A Consolid.	351—366	55—60	15 56½
724,220	"	"	11	31/8	Do. B New	204—209	50—55	54
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	76—79	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	64—66	..
214,775	"	Sept. 11	11	7½%	Brighton & Hove Orig.	208—213	123—128	..
244,200	"	"	8	5½%	Do. A Ord. Stk.	154—159	84—89	..
988,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	10	Sept. 26	13½	10%	British	44—45	24—26	25 25½
120,000	Stk.	June 27	4	4%	Do. 4 p.c. Deb. Stk.	88—90	63—65	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—53	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	6½—7½	..
100,000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7	..
100,000	Stk.	June 27	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	61—66	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,518,280	"	Aug. 14	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	55—60	55—56
560,000	"	"	5½	26/8	Do. 3½ p.c. do.	103—105	50—55	10—53
475,600	"	June 11	8	8%	Do. 3 p.c. Deb. Stk.	69½—71½	50—52	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	35—40	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	60—65	..
51,600	Stk.	Aug. 28	14½	12%	Croydon A 10 p.c.	..	150—160	..
278,400	—	"	11½	9%	Croydon B and C 7 p.c.	..	100—110	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	133—136	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,009,180	10	July 30	10	5/0	European, Ltd.	17½—18	12—13	..
16,298,975	Stk.	"	4/17/6	30/-	Gas { 4 p.c. Ord.	98—102	60—63	59⅜—62
2,600,000	"	"	8½	26/8	Light { 3½ p.c. max.	76—79	45—47	45½—45½
4,062,235	"	"	4	4%	and { 4 p.c. Con. Pref.	96—99	65—68	66 67
4,674,850	"	June 11	8	8%	Coke { 3 p.c. Con. Deb.	72½—74½	52—55	..
130,000	"	"	10	10%	10 p.c. Bonds	..	..	..
82,500	"	Sept. 11	5	4⅓%	Hastings & St. L. 5 p.c.	..	57—62	..
268,740	"	"	8½	2½%	Do. 3½ p.c	37—39	40—45	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16½	8½—9½	..
66,600	Stk.	Aug. 28	9	8½%	Hornsey 7 p.c.	..	90—95	90
181,000	"	Sept. 11	7½	5⅝%	Ilford A and C.	151—154	88—93	..
65,780	"	"	6⅔	4⅔%	Do. B	115—118	67—72	..
65,500	"	June 27	4	4%	Do. 4 p.c. Deb.	92—94	61—64	..
6,940,000	"	May 14	9	4½%	Imperial Continental	156—160	133—138	133—136
1,295,000	"	Aug. 14	8½	5½%	Do. 5½ p.c. Deb. Red.	84—86	81—84	82—83½
285,342	"	Sept. 11	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	87—92	..
2,498,985	"	Feb. 26	10	42/6	Liverpool 5 p.c. Ord. { A	211—215	..	..
					{ B	145—148		..
806,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
155,736	"	Aug. 14	7/5/8	8⅔%	Maidstone 5 p.c.	..	56—61	..
75,000	5	June 11	6	8%	Malta & Mediterranean	4¼—4¾	1½—2½	..
250,000	100	Oct. 1	4½	4½%	Met. of { 4½ p.c. Deb.	99—101	90—97	..
					Melbourne {			
541,930	Stk.	May 29	4	—	Monte Video, Ltd.	11½—12	73—80	71—80
1,875,892	"	July 30	4½	3½%	Newcastle&Gatsh'd Con.	98½—99½	64—65	..
599,705	"	June 27	8½	8½%	Do. 3½ p.c. Deb.	85—88	57—58	..
15,000	10	Sept. 11	—	11%	North Middlesex 10 p.c.	..	13½—13½	..
55,940	10	"	7/14/0	7%	" " 7 p.c.	14—15	9—9½	..
900,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—107	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	4½—5½	..
60,000	50	Aug. 28	18	7½%	Porteen, Island B	126—131	74—76	..
100,000	50	"	12	6½%	Do. C	118—121	66—68	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1½—2	32/6—37/6
499,960	5	June 26	6	—	Do. 5 p.c. Pref.	4½—5	3½—3¾	67/6 68/9
531,600	100	June 9	4	4%	Do. 4 p.c. Deb.	91—98	71—73	51½
600,000	Stk.	July 30	4	4%	Do. " " 1911	..	49—52	..
946,198	"	June 27	4	4%	River Plate 4 p.c. Deb.	85—87	49—52	..
150,000	10	Sept. 26	6	5/-	San Paulo { 6 p.c. Pref.	10½—11	7½—8	..
195,000	50	July 2	5	5%	{ 5 p.c. Deb.	4½—49	40—42	..
185,000	Stk.	Aug. 28	10	5%	Sheffield A	228—234	57—92	..
209,984	"	"	10	5%	Do. B	229—234	87—92	..
528,500	"	"	10	4⅔%	Do. C	230—232	80—85	..
188,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	Oct. 15	9	10%	South African	10½—11½	12—13	..
6,609,895	Stk.	Aug. 14	5/4/0	30/-	South Met. 4 p.c. Ord.	111—113	59—62	58½—61
250,000	"	July 11	—	5%	Do. Pref.	..	94—96	94½—95
1,895,445	"	"	8	8%	Do. 3 p.c. Deb.	73½—74½	51—54	52½
294,320	"	Aug. 14	8½	5%	South Shields Con. Stk.	157—159	104—106	
962,796	"	"	6	3⅔%	S'th Suburb'n Ord. 5 p.c.	114—116	68—73	..
187,558	Stk.	June 27	5	5%	Do. 5 p.c. Deb. Stk.	116—118	85—88	..
647,740	"	May 14	7½	8%	Southampton Ord.	99—102	68—68	..
131,975	"	June 27	4	4%	Do. 4 p.c. Deb. Stk.	..	63—65	..
190,000	"	Aug. 14		4½%	Tottenham { A 5 p.c.	135—138	70—75	75
762,975	"	"	6	3⅔%	District { B 3½ p.c.	115—117	50—55	54
181,365	"	June 26	4	4%	{ 4 p.c. Deb.	87—89	64—66	..
182,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
142,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
296,476	Stk.	Sept. 26	5	3⅓%	Tynemouth 5 p.c. max.	108½—109	74—76	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	"	Aug. 28	6⅔	55/-	Wandsworth A 5 p.c.	151—156	85—90	..
355,696	"	"	6⅔	40/-	Do. B 3½ p.c.	122—124	63—68	..
108,075	"	"	—	33/6	Do. C	..	63—68	..
140,865	"	"	—	33/6	New Ordinary	..	63—68	..
252,000	"	"	6⅓	33/9	Wimbledon 5 p.c.	117—122	65—70	..
98,000	"	"	6⅔	40/-	Epsom 5 p.c.	121—126	65—70	..
86,416	"	June 27	3	3%	3 p.c. Deb. Stk.	66—69	49—51	

* Ex Div.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under (about 36 words) 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	28/- ..	15/- ..	8/8
	Credit Rate:	32/- ..	16/- ..	9/6
Abroad (in the Postal Union) Payable in Advance		32/6 ..	17/- ..	10/-

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.